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Marine Turtle Conservation in the Mediterranean
Marine Turtles in Egypt

Phase I
Survey of the Mediterranean coast between
Alexandria and El-Salum

by Max Kasperek
scientific project leader
MEDASSET



MEDASSET
Mediterranean Association to Save the Sea Turtles
(United Kingdom and Greece)

RAC / SPA
Regional Activity Centre for Specially Protected Areas Tunisia
Mediterranean Action Plan (UNEP)

in cooperation with
National Institute of Oceanography and Fisheries Egypt
(NIOF)

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The Project Team

Max Kasperek, Heidelberg

Amany Said Mohammed, Port Said

Maha Ebeid, Port Said

Essam M. Abdelmawla, Alexandria

Khaled Mahmoud Abdel-Salam, Alexandria

El-Azab Badr, Mataria

Martin Brändle, Tübingen

Andreas Hachenberg, Unterensingen

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Summary

The Mediterranean Association to Save the Sea Turtles (MEDASSET) and the Regional Activity Centre for Specially Protected Areas, Tunisia (RAC/SPA) carried out a survey of the Mediterranean coast of Western Egypt for nesting of marine turtles. The project was run in cooperation with the National Institute of Oceanography and Fisheries, Alexandria (NIOF) and with a mixed team of Egyptian and German research assistants headed by Dipl.-Biol. MAX KASPAREK (Heidelberg, Germany).

The coast between Alexandria and El-Salum was divided into five regions:

| Name of the region | coast length | no. of beaches | total beach length |
|--------------------|---------------|----------------|--------------------|
| Arabs Gulf | 170 km | 24 | 91.6 km |
| Gulf of Hekma | 77 km | 7 | 26.0 km |
| Abu Hashafa Bay | 82 km | 5 | 31.5 km |
| Marsa Matruh West | 174 km | 18 | 59.6 km |
| Gulf of Salum | 99 km | 10 | 46.1 km |
| total | 602 km | 63 | 254.8 km |

1. All beaches between Alexandria and El-Salum on the Libyan border were surveyed for the occurrence of marine turtle nests during the peak nesting season in June and July 1993. The survey was carried out using ground patrols. An assessment of the coast for potential nesting of marine turtles was made and information on habitats and other animal species was compiled.

2. 255 km of the 602 km of the surveyed coast consists of sandy beaches, forming a potential nesting area for marine turtles. The remaining coast is rocky.

3. Marine turtles were found to nest in the study area. Successful nesting was confirmed through records of hatchlings. All tracks of emerging nesting turtles were identified as tracks of the Loggerhead Turtle, *Caretta caretta*. It is the first time that confirmation of marine turtle nesting has been made for this coast.

4. Nesting numbers are low and insignificant compared to other parts of the Mediterranean (Turkey, Greece). Nests were more or less randomly scattered over the entire study area. No concentration of nesting was found on any particular beach.

5. The survey teams received information about marine turtles' nesting in the eastern Nile delta, i.e. in the area that will be covered during the second phase of this survey.

6. The lack of large rookeries of marine turtles between Alexandria and El-Salum emphasizes the need for the protection of the already known important nesting beaches in Greece and in Turkey and the need for a complete survey of the East Egyptian and the Libyan coasts for hitherto unknown nesting beaches.

7. Fishermen and local people were interviewed for information about marine turtles. All fishermen were familiar with them and have confirmed their occurrence in the sea. Fishermen will catch them whenever they encounter them.

8. Marine turtle meat is consumed only by few people, including copptic Christians and Muslims. Some people drink their blood, which is considered to be an aphrodisiac and to increase fertility.

9. The only place where turtles are offered and sold for consumption is the fish market in Alexandria. Turtles caught in other areas, e.g. at Marsa Matruh, are brought to the Alexandria market.

10. Several dead turtles were found washed ashore. They all, including the ones seen in fishmarkets and elsewhere were identified as Loggerhead Turtles (*Caretta caretta*). No indications of Green Turtle (*Chelonia mydas*) occurrence was found in the Egyptian waters.

11. The study area holds large, almost unspoilt, coastal ecosystems with white primary sand dunes and limestone cliffs which we found to be unique in the Mediterranean area.

12. Tourist development is growing rapidly with many new holiday villages, hotels and recreation facilities being built particularly between Alexandria and El-Alamein. This development is threatening the coastal ecosystems.

13. The Egyptian coast is badly polluted with crude oil and plastic rubbish which is washed ashore. Terns were observed which were heavily coated with oil. From the inscriptions on plastic bags and wrappings, it was understood that the main source of rubbish comes from Egypt, Italy and Greece.

14. The study area does not provide suitable habitats for the Monk Seal (*Monachus monachus*). Rocks are rather flat at most locations and no coastal caves were seen. No tracks of Monk Seals were found on the sand and none of the fishermen and local people that were interviewed by our team knew about any occurrence of Monk Seals in the Egyptian waters.

15. The Greater Sand Plover (*Charadrius leschenaultii*) was found to be a regular summer visitor to the West Egyptian Mediterranean coast and it may breed in the coastal wetlands. If so, this would be the westernmost and only African point of the distribution area of this rare species.

Recommendations

Conservation of habitats

1. **Egypt** to protect, the so far, almost unspoilt, coastal habitats against development. The dunes of white calcereous sands and limestone ridges are unique in the Mediterranean. They should be conserved and declared a national heritage, and should be protected by law.
2. **Egypt** to establish a Coastal National Park between Marsa Matruh and El-Salum ("Sidi Barrani National Park"). Vast sand dunes, calcereous limestone ridges and temporary salt lakes are found over an area of about 150 km and almost no development has taken place there so far. This is the largest continuous unspoilt coastal ecosystem in Western Egypt and one of the largest of the entire Mediterranean.
3. **Egypt** to prepare a development and management plan for the proposed Sidi Barrani National Park. Such a plan is necessary to define the exact boundaries of the park, to establish a zonation of the park, and to develop sustainable use and park management.
4. **Egypt** to establish nature reserves and/or specially protected areas in the Gulf of Hekma, in the Abu Hashafa Bay and to the west of Marsa Matruh. Some of these areas have military status now and thus restricted access and restrictions to development. However, tourist development is an imminent threat and several sandy beaches between El-Alamein and Alexandria, which were military areas before, are now being developed for tourism. One is afraid that the same fate could await other similar remote areas in the near future.
5. **Egypt** to establish a set of nature reserves in the Arabs Gulf. Heavy tourist development is already going on there and it seems to be necessary to protect some areas from this development.
6. **Egypt** to protect the wetlands that are separated from the sea by sand dunes and a limestone ridge. They are thought to be an important breeding, resting and wintering ground for migratory birds and are seriously threatened by future and current tourist development.

Pollution

1. **Egypt** to take immediate steps, nationally and internationally, against pollution of their sea and their beaches with crude oil and

plastic litter. International bodies like UNEP (MAP) are asked to support the Egyptian Government in its efforts against pollution of the Mediterranean Sea.

Marine Turtle Exploitation

1. to enforce by national legislation the main statements of the international legislation signed by the Egyptian government.

2. The Egyptian Authorities should make sure that legislation forbidding commercial turtle trade should be properly enforced. The only place in the study area, where turtles are offered for sale is the fish market of Alexandria. Therefore it should be relatively easy to control the entire turtle trade.

Research

1. More extensive research should be carried out in the study area for a better understanding of the wildlife and wild flowers of white sand dunes and limestone ridges. This type of ecosystem is almost unique in the entire Mediterranean area and should be subject of an ecological study.

2. Bird winter census should be made on the flat salt pans at the rear part of sand dunes in order to determine the importance of these areas for wintering waterfowl. A spring study should also be made on breeding birds of the same areas.

Acknowledgements

This survey was undertaken within the framework of the Mediterranean Action Plan (MAP) Coastal Area Management Programme for the Fuka-Matrouh area (Egypt) and was made possible thanks to help and support provided by several people. MEDASSET^{of RAC/SPA} would like to thank Prof. Dr. ALI IBRAHIM BELTAGY, National Institute of Oceanography and Fisheries (NIOF) Alexandria, Egypt, for his invaluable support throughout the project and for providing us with an excellent survey team, vehicles with drivers and last but not least with the necessary permits which allowed access to the coastal area.

The survey was made possible thanks to close cooperation between the teams, the coast guards, the military authorities, the navy, the intelligence service and the local governors. We wish to thank them all for their generous help and for allowing the research teams to work in sensitive areas of the coast. The researchers shall always remember the warm hospitality shown to them by the guards and the soldiers. They hope to be forgiven for not always being able to accept invitations for a cup of tea due to shortage of time. The researchers also wish to thank all the local people and the fishermen who so willingly provided them with information concerning the occurrence of marine turtles.

Equally MEDASSET is grateful to Mr. MOHAMED SAIED, Director of the Regional Activity Centre for Specially Protected Areas in Tunisia (RAC/SPA Tunis), for his invaluable help and encouragement, and Mr. IBRAHIM DHARAT of the Mediterranean Action Plan (UNEP) in Greece, for his help with the project.

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Part I

The beach Survey

1 Introduction

Two species of marine turtles nest in the Mediterranean basin, namely the Loggerhead Turtle, *Caretta caretta*, and the Green Turtle, *Chelonia mydas*. Both species are highly endangered in the Mediterranean mainly by human pressure and loss of their nesting habitats. Substantial nesting of the Loggerhead Turtle now occurs at less than 20 beaches in Turkey and Greece. Nesting of the Green Turtle nowadays appears confined to a handful beaches in Turkey and Cyprus. All known nesting sites of both species are seriously threatened mainly by tourist development, and the number of nesting turtles has decreased sharply as a result. Therefore, any nesting site of marine turtles in the Mediterranean is in need of full protection.

It is even more important that all other significant nesting beaches of marine turtles in the Mediterranean are identified in time for steps to be taken to protect them before tourist and/or other development reaches the stage it has at the already known nesting beaches in Turkey, Greece, Syria and Cyprus. Conservation measures are much easier to impose for undeveloped areas than for areas where development is already going on.

Previous work on marine turtles was concentrated in Turkey, Greece, Cyprus and Syria. The known nesting beaches on Zakynthos and along the coast of the Peloponnesus in Greece have been relatively well studied and are subject to current conservation measures. The Greek Aegean coast and the North Aegean islands with a total coast of 2,078 km were surveyed in 1991. The Turkish Aegean and Mediterranean coast with a total coastline of 2,456 km was completely surveyed in 1988 and 13 major nesting beaches together with four beaches which are of vital importance, although they hold smaller numbers of nesting turtles, were found. The Syrian coast was surveyed completely in 1991 and one nesting beach of marine turtles was found. Northern Cyprus was surveyed in 1991 and several small nesting beaches were found. The coast of Southern Cyprus is regulated by long standing conservation controls for marine turtles. The coast of Sardinia was surveyed in 1991. Several of these surveys were carried out by MEDASSET and/or headed by M. KASPAREK who also carried out the Egyptian survey.

The Egyptian and Libyan coasts have never been surveyed for marine turtle nesting and in the light of the abovementioned surveys in the Eastern Mediterranean, would seem to be the most promising coasts. There was some evidence that marine turtles actually nest in Egypt, namely on the North Sinai coast between Port Said and

the Gaza area. The climate of Egypt is well suitable for turtle nesting, and from this point of view, one may expect larger populations than for example in Greece where turtles nest at the edge of their distribution area. Furthermore, the Egyptian coast consists largely of sandy beaches which are rather undeveloped and thus may provide an excellent nesting habitat.

For these reasons, Egypt was expected to show high occurrences of marine turtle nesting, and Egypt together with Libya hold the highest priority for a complete coastal survey.

2 The status of marine turtles in Egypt

2.1 Previous knowledge of the status of marine turtles in the Egyptian Mediterranean Sea

Only a small amount of information on the status of marine turtles in Egypt was available; and in particular, upto-date information.

Both the Green Turtle (*Chelonia mydas*) and the Loggerhead Turtle (*Caretta caretta*) are known to have been present in the Egyptian Mediterranean Sea since 1933 (FLOWER 1933). FLOWER frequently saw Green Turtles being purchased alive in Port Said and described the Loggerhead Turtle as the commonest turtle off the Mediterranean coast of Egypt. Specimens said to be from Alexandria, Lake Burullus, Damietta (at lake Manzala), and Port Said were brought alive to Cairo for sale in 1901-1902. FLOWER himself also saw a fairly large Loggerhead Turtle on the market of Alexandria and reported a skull from the North Sinai coast. He also learnt that marine turtles occur at Lake Manzala (in the eastern part of the Nile Delta) which has an outlet to the sea, but he failed to find out which species it was. He also received a report that a "large turtle" was killed near El-Arish on the North Sinai coast which had eggs in it. It is not known, whether FLOWER's statement that "turtles resort to the Mediterranean coast of Sinai to deposit their eggs" is based only on this report or whether he had other sources available.

The catching of a female turtle just before clutch deposition on the North Sinai coast was thus the only hint of turtle nesting in Egypt. No further information on turtle nesting was recorded for about half a century, until a map in the publication by SELLA (1982) showed scattered turtle nesting on the North Sinai coast between Port Said and the Gaza area and even proposed a turtle reserve at Bardawil lagoon. Unfortunately, she did not give an explanation or an information source in the text and so it cannot be ruled out that all her information was based merely on FLOWER.

There is now a recent report by WAHID SALAMA from the Egyptian Environmental Affairs Agency that marine turtles nest on the sandbar which separates Lake Bardawil from the sea. Significant numbers seem to be involved (GROOMBRIDGE 1990). Unfortunately, no details are available. In another document (MAP 1989),

WAHID SALAMA is cited as follows: "The Bardawill lagoon and the surrounding coastal area were very important nesting areas for marine turtles. Green turtles and Loggerhead Turtles were commonly sighted during the breeding season in early summer along the sand bar separating the lagoon from the Mediterranean. Green Turtles and Loggerhead Turtles were sometimes caught in fishing nets in the lagoon; about 50 such catches are reported annually. The fishermen do not distinguish between the species. The Leatherback Turtle was found in open water only. Fishermen who catch them in their nets in the open sea usually return them to the water for good luck." It is not known, whether WAHID SALAMA himself observed nesting females, or whether he got information by local people; the year (years?) of observation is also not known. Therefore, it should be taken as a strong indication of marine turtle nesting, for which confirmation is still required.

Finally, an interesting observation by DERANIYAGALA (1951) on a mass migration of marine turtles 350 miles west of Port Said must be mentioned. On September 17th, 1947, he observed a large flock of marine turtles heading eastwards towards Port Said. The turtles were seen over a distance of about 110 km and the distance of one individual to the next was some 180 metres, resulting thus in at least 600 migrating turtles. The species involved is not clear, but they may have been Green Turtles.

Summarizing these results, one understands that there are strong indications that marine turtles nest on the North Sinai coast and probably in the Nile Delta. However, confirmation is required and data on the magnitude of any nesting needs to be assessed. Nothing was known on nesting on the Western Egyptian Mediterranean coast.

2.2 The status of marine turtles in the Egyptian Red Sea

Considering the status of marine turtles in Egypt, a short overview over the Egyptian Red Sea should be given. The most thorough review was given by FRAZIER & SALAS (1984), but cf. also GASPERETTI et al. (1993). Five species of marine turtles were recorded in the Egyptian Red Sea. The Hawksbill Turtle, *Eretmochelys imbricata*, is the most common species found and nesting has been confirmed. However, nesting would seem to be scattered over a wide area and the total number of nesting females would seem to be lower than 200. Most of the nesting takes place on islands and only a few nest have been recorded on the mainland. The Green Turtle, *Chelonia mydas*, would also seem to nest on the Egyptian Red Sea occasionally, but confirmation of this is required. If nesting actually takes place, the numbers are low and may be lower than some 10 females. The Leather Back Turtle, *Dermochelys coriacea*, the Olive Ridley, *Lepidochelys olivacea*, and the Loggerhead Turtle, *Caretta caretta*, were all recorded only a few times each in the Egyptian Red Sea waters and their occurrence is irregular with no evidence of nesting.

According to the literature, it would seem that the coastline of the Egyptian Red Sea does not play a very important role in marine turtle nesting. However, many coastal areas are still unsurveyed and important nesting grounds may still be discovered. On the other hand, the number of turtles feeding in the coral reefs seem to be very high (many divers report having seen marine turtles e.g. at Ras Mohammed and at Hurghada). Immigration to these feeding grounds apparently takes place.

3 Survey techniques

The survey was carried out by ground patrols. This was done by walking along the beach to look for turtle tracks. All patrols were made during the day, preferably in the morning. Patrols at night were not made, as turtles are easily missed at night, when they come onto the beach for clutch deposition, but their tracks can easily still be seen often a couple of days after the emergence.

During the survey, we took into account that the chance for finding a marine turtle track depends on many factors.

- the visibility of a track greatly depends on the texture of the beach. A track is easily visible in the wet sand, but hardly visible in dry coarse gravel.
- the visibility of a track greatly depends on the time of the day. This is especially important for partly obliterated, older tracks. The morning and evening sun makes shadows which make the tracks easier to see even from greater distances. At noon, a careful close examination is often required.
- the longevity of a turtle track greatly depends on the type of the beach, e.g. on its substrate, width, human (and other) use, and even on the weather of the region. Loose sand (moving sand dunes!) does not preserve a turtle track for a long time, even a light breeze will obliterate the tracks here. Turtles usually walk on a wide beach a longer distance than on a narrow one and a long track has a higher chance to be found than a short one. A beach which is heavily used during daytime (for example by tourists) will hardly have any tracks in the evening, whereas a remote beach will. In regions with a lot of wind (sea winds, evening winds, afternoon breeze etc.), tracks will be obliterated more rapidly than in others without regular winds.

Aerial surveys have been suggested for the coverage of the hitherto unsurveyed beaches in the Mediterranean (e.g. MAP 1992). Aerial surveys give, without doubt, results in a short time. Comparison of the results of aerial surveys with concurrent ground surveys in the USA (CROUSE 1984) yielded very different results from beach to beach. CROUSE concluded that the method of aerial surveys is not useful for population estimates, but may be used for mapping relative density and distribution of nesting attempts. This should be kept in mind for future studies in the Mediterranean.

When applying only aerial surveys, no information on the physical structure and ecological conditions of the nesting and potential nesting beaches of marine turtles

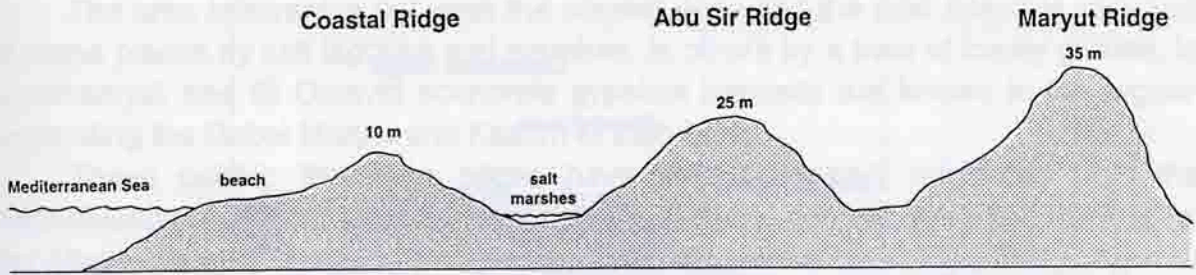


Fig. 1. Schematic cross section of the coastal region of Western Egypt. Three limestone ridges run parallel to the coast.

can be collected. Therefore, aerial surveys should only be done, when the ecological conditions of the study area are already known from a previous ground survey.

The basis of the survey was the 1:500,000 nautical chart edited by the British Admiralty and first published in 1942 with additions and corrections to 1976. The 1:100,000 topographical map and several large-scale road maps were also used.

4 The study area

4.1 Topography

The study area belongs to the Western Mediterranean Coastal Desert of Egypt. This is a distinct northern part of the Western Desert and extends from Alexandria westward about 600 km to El-Salum. It varies in width from 15 to 30 km in the eastern and central sections to a few kilometres in the west, south of the cliffs of El-Salum. Other names applied for this area are Mareotis and Marmarica.

The main difference between the Egyptian Western Mediterranean Coast and the Eastern Mediterranean Coast (Sinai) is the fact that it is calcareous rather than siliceous and that it has a higher precipitation.

The fact that the country is generally low lying and exposed to severe erosion by north-east as well as south-west winds all the year round, added to exhaustive grazing and collection of plants for fuel on large scale, have undoubtedly hindered the natural development of the vegetation and of the soil (TADROS 1954).

There are no rivers, creeks etc. along this part of the coast. Mainly because of the limestone ridges which run parallel to the coast, not even wadis run into the sea. The annual runoff from the coastal desert which carries large quantities of soil is apparently being collected in the valleys between the limestone ridges running parallel to the coastline.

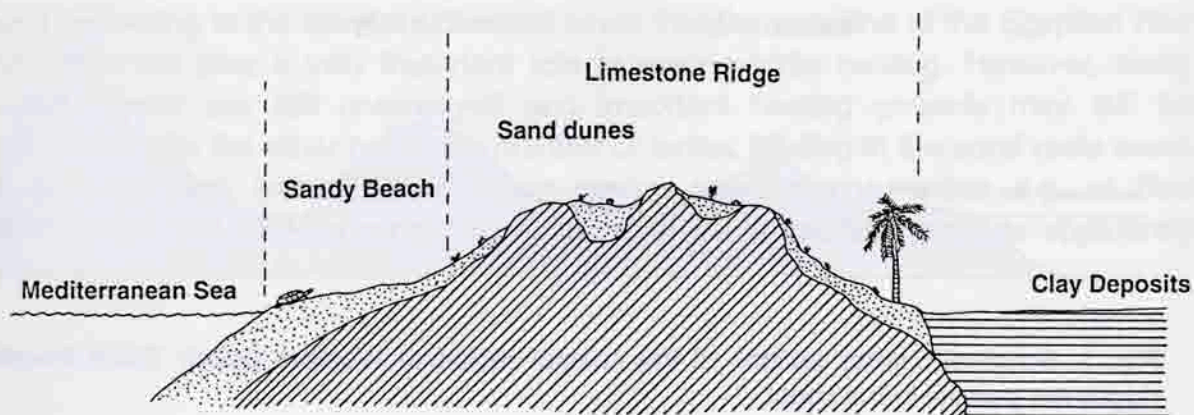


Fig. 2. Typical cross section of the Mediterranean coast of Western Egypt. The sand dunes cover a limestone ridge.

4.2. Geology

Almost the whole coast is formed by a limestone ridge covered by sand dunes. The limestone ridge belongs to a set of Pleistocene formations which all run parallel to the coast, separated by longitudinal depressions. The nearest three ridges to the shore are 10, 25 and 35 m high and are called the Coastal Ridge, Abu Sir Ridge and Maryut Ridge. They can clearly be followed for long distances along the coast. The successive five inland ridges, the 60, 80, 85, 90 and 110 m high ridge (named the Khashm El Eish, Alam El Khadem, Mikheirta, Raqabet El Halif and Alam Shaltut), are less conspicuous and do not form continuous ridges (SAID 1990). The width of the ridges vary from some tens of metres to some hundreds of metres. Digging near the shore around Marsa Matruh has shown that the oolitic deposits could be traced down to about 43 metres below the present level (BALL in TADROS & ATTA 1959b).

The elongated ridges are composed mainly of soft oolitic limestone. It consists mainly of false-bedded grains which are made up primarily of carbonate (CaCO_3 sands). These grains are poorly cemented by widely spaced needle-like crystals of calcite, causing friability of rock. Drifted carbonate oolitic grains in the form of dunes lie unconformably on the ridge. The dunes are fashioned by the influence of onshore winds which are predominantly north-western. Sand moves inland in a series of transverse dunes. Close to the shore, they are relatively small and active. Further inland, they become larger and, being more heavily covered by vegetation, tend to become more or less stabilized. They exhibit a typical dune form with gentle windward slopes and steep leeward slopes. In the shelter of stabilized dunes, active deposition of sand in front of steep leeward slopes results in the formation of sand shadows (AYYAD 1978).

The area intervening between the coastal ridge and the next inland is occupied in some places by salt lagoons and marshes, in others by a tract of loamy ground. In Gharbaniyat and El Omayid economic gypsum deposits are known in the lagoon separating the Gebel Maryut and Kashm El Eish bars.

These oolitic limestone ridges have almost certainly originated from the consolidation of ancient sand dunes. From this fact one can conclude that the level of the Mediterranean Sea once had been at least 43 metres lower than today. Another theory is that these limestone ridges represent successive fossile offshore bars that were formed in the receding Mediterranean during the Pleistocene (SAID 1990).

The limestones are easily cut and square stones are the usual (and cheap) building material for houses, walls etc. As a consequence of the great demand for building materials and the easy access to the limestones, the limestone ridges have been exploited and thus completely taken down in many areas, in particular in areas close to Alexandria. Only flat areas remain there.

4.3 Climate

The study area has a typical Mediterranean climate. It is characterised by a long fairly warm season and a short slightly rainy temperate winter, favourable for a therophytic biological spectrum.

Precipitation falls mainly during the colder season from autumn to spring. Most of the rain falls during the period between October and February (mostly in December and January), with a mean annual of about 150 mm. This is about six times the precipitation at Cairo. Mean precipitation is 107 mm at El-Salum, 149 mm at Sidi Barrani, 158 mm at Marsa Matruh and 184 mm at Alexandria (WALTER & LIETH 1960). The amount of precipitation thus increases from the east to the west. However, the amount of precipitation varies considerably around this mean from one year to the other. In some years it reaches above 275 mm, while in others it hardly exceeds 50 mm.

The average temperature is around 20°C; it is 20.6°C at El-Salum, 18.4°C at Sidi Barrani, 19.1°C at Marsa Matruh and 20.2°C at Alexandria (WALTER & LIETH 1960). The average maximum temperature is 25.2°C for Alexandria and 23.8°C for Marsa Matruh. The average minimum temperatures are 17.8°C and 15.5°C (TADROS 1954). The annual mean temperatures are thus about 2°C higher at Alexandria than at Marsa Matruh. At Marsa Matruh, the absolute maximum is 41.0°C, the absolute minimum 5.0°C. The daily amplitude of temperature is 6°C in winter, less of it in summer. This causes a relatively high humidity in particular in summer, when it reaches 82% (July). It falls to 61% in February (WALTER & BRECKLE 1991).

Tab. 1. Phytogeographical zones for the littoral semi-desert of the study area (after KASSAS 1955).

A. Littoral oolitic sand dunes

Characteristic plant species are:

Euphorbia paralias

Pancratium maritimum

Ammophila arenaria

Ononis vaginalis

cultivated figs etc.

B. Sub-littoral and inland oolitic limestone ridges 3 km apart

Characteristic plant species are:

Globularia arabica

Thymus capitatus

Helianthemum lippii

Asphodelus microcarpus

lichen growth etc.

C. Salt marshes between the rocky limestone ridges

Characteristic plant species are:

Halocnemon strobilaceum

Limoniastrum monopetalum

Arthrocnemon glaucum etc.

D. Inland plains

Characteristic plant species are:

barley (barley fields)

olive tree (olive groves)

Thymelaea hirsuta

Anabasis articulata

Papaver dubium

Chrysanthemum coronarium

Carthamus tenuis

When the climate of Alexandria and Marsa Matruh is compared, it becomes evident that Alexandria is slightly hotter, more rainy, but less humid than Marsa Matruh.

4.4 Plant cover

The study area has a unique vegetation. The plants of the sand dunes can be classified into nine life forms: annuals, perennial grasses, perennial herbs, evergreen succulent perennial subshrubs, evergreen non-succulent perennial subshrubs, partially deciduous perennial subshrubs, evergreen succulent perennial shrubs, evergreen non-succulent perennial shrubs and deciduous perennial shrubs. Annuals form the

Tab. 2. Means of density (plant unit/100 m²) and cover (cm/100m) recorded in 28 stands in the sand dunes of the Mediterranean coast 53 km west of Alexandria in 1974 and 1977 after three years of protection (from: AYYAD 1978).

| Species | density | | cover | |
|-------------------------------|---------------|---------------|---------------|---------------|
| | | | | |
| <i>Aegialophila pumila</i> | 5.6 | 16.7 | 0.0 | 8.3 |
| <i>Ammophila arenaria</i> | 1732.6 | 1143.4 | 288.8 | 226.2 |
| <i>Crucianella maritima</i> | 108.9 | 626.7 | 43.5 | 82.8 |
| <i>Echinops spinosissimus</i> | 297.4 | 557.1 | 144.8 | 96.9 |
| <i>Echium sericeum</i> | 16.4 | 63.6 | 59.1 | 41.0 |
| <i>Elymus farctus</i> | 750.7 | 1499.1 | 120.7 | 113.7 |
| <i>Eryngium campestre</i> | 22.2 | 25.8 | 6.7 | 22.7 |
| <i>Euphorbia paralias</i> | 194.6 | 84.9 | 214.3 | 282.8 |
| <i>Gymnocarpos decandrum</i> | 3.2 | 6.8 | - | - |
| <i>Helianthemum lippii</i> | 26.5 | 51.0 | 22.8 | 85.3 |
| <i>Hyoseris lucida</i> | 12.4 | 38.1 | 2.6 | 4.4 |
| <i>Launaea resedifolia</i> | 74.8 | 388.4 | 14.4 | 53.2 |
| <i>Lotus creticus</i> | 14.2 | 4.0 | - | - |
| <i>Lotus polyphyllus</i> | 31.8 | 58.8 | 10.5 | 31.4 |
| <i>Lycium europaeum</i> | 3.5 | 9.0 | 69.2 | 68.6 |
| <i>Lygos raetam</i> | 3.4 | 5.2 | 48.5 | 126.2 |
| <i>Ononis vaginalis</i> | 31.6 | 93.1 | 29.5 | 63.8 |
| <i>Pancratium maritimum</i> | 388.1 | 153.2 | 172.5 | 65.6 |
| <i>Pituranthos tortuosus</i> | 4.0 | 5.8 | 30.0 | 3.8 |
| <i>Plantago albicans</i> | 216.6 | 641.7 | 22.2 | 65.8 |
| <i>Salvia lanigera</i> | 21.6 | 35.7 | 6.0 | 5.2 |
| <i>Silene succulenta</i> | 29.6 | 19.1 | 2.7 | 6.3 |
| <i>Teucrium polium</i> | 10.4 | 7.6 | 25.8 | 7.5 |
| <i>Thymelaea hirsuta</i> | 15.7 | 19.5 | 343.2 | 239.1 |
| Others | 30.1 | 82.2 | - | - |
| Total | 4015.8 | 5554.3 | 1677.8 | 1700.6 |

highest percentage of the total flora, followed by evergreen non-succulent perennial subshrubs and the perennial herbs.

TADROS (1954) found that the halophytic plant associations are peculiar and reflect their own special ecological conditions. They are, however, related to other halophytic circum-Mediterranean communities by the principal characteristics which have a wider distribution and a greater ecological amplitude than the local members of the associations.

KASSAS (1955) has defined four phytogeographical zones for the littoral semi-desert of the study area (Tab. 1).

Trees are completely absent from the Western Coastal Desert. There are only some cultivated olive trees and figs are cultivated in a semi-wild state on the coastal dunes, but they are usually not higher than 2-3 m.

The vegetation of the sand dunes suffers a great deal from human influence, in particular from grazing by sheep, goats and camels. AYYAD (1978) made an interesting experiment to estimate the degree of the human influence: he fenced a sand dune area 500 m from the coast and 53 km west of Alexandria and then he determined the composition, density and cover of vegetation at the beginning of the experiment and again three years later. The results are shown in Tab. 2. After three years of protection, there was an overall increase in the density of species of 38.0%. On the other hand, there was almost no change in the total cover of vegetation, the increase in some species was nearly balanced by the decrease in others. The increase in density was contributed mainly by *Crucianella maritima*, *Elymus farctus*, *Plantago albicans* and *Launaea resedifolia*. The species which exhibited notable increases in cover were *Aegialophila pumila*, *Helianthemum lippii* and *Lygos raetum*, and those which exhibited notable decreases were *Parcratium maritimum*, *Pituranthos tortuosus* and *Teucrium polium*.

5 Results

5.1 Marine turtles

5.1.1 Marine turtle nesting

Marine turtles were found to nest along the coast between Alexandria and the Libyan border. A total of 10 tracks from emerging female marine turtles were found on the beach:

A further proof for marine turtle nesting was received by a baby Loggerhead Turtle which was found on beach no. 3.2. in the Abu Hashafa Bay on 4 July 1993. It had died a few days prior to the survey.

The marine turtle tracks were more or less evenly scattered over the whole study area (cf. also map). Tracks were noted in four of the five regions and only on two beaches was there more than one track. Therefore marine turtle nesting takes place with random distribution without concentration on certain nesting beaches.

For reasons of conservation, the survey teams did not dig the turtle nests. Therefore we cannot be sure whether (all) the tracks on the beach resulted in successful clutch deposition. However, the record of a baby marine turtle confirms that nesting is actually successful in the study area.

A result of 10 marine turtle tracks (plus further proof of marine turtle nesting) is a negligible figure when considering that the study area was 602 km, of which 255 km was sandy beaches. It should be recalled here that the survey was done in the peak nesting season and that all beaches were patrolled completely from one end to the other. The coverage was therefore 100%. Confirmation of the survey results was received from interviews with soldiers and coastal guards. They had seen almost all

Tab. 3. Number of sea turtle tracks found between Alexandria and El-Salum in 1993. The table gives the regions, beach numbers, dates and number of tracks.

| region | beach no. | date | track |
|-------------------|-----------|----------|-----------|
| Arabs Gulf | 1.16. | 09.07.93 | 1 |
| Arabs Gulf | 1.24. | 06.07.93 | 3 |
| Marsa Matruh West | 4.7. | 28.06.93 | 3 |
| Marsa Matruh West | 4.8. | 28.06.93 | 1 |
| Gulf of Salum | 5.1. | 02.07.93 | 1 |
| Gulf of Salum | 5.2. | 01.07.93 | 1 |
| total no. | | | 10 |

marine turtle tracks, which we found, prior to the survey and confirmed that in other seasons, no higher numbers of tracks had been seen.

5.1.2 Marine turtles at sea

Several dead marine turtles were found washed ashore. In general, we did not know the reason for their deaths. Dead marine turtles are also found in other countries of the Mediterranean and there is no reason to believe that the number of dead marine turtles is higher or lower than in other countries. Only in one instance, the neck of a marine turtle had been cut and this may have been done intentionally by fishermen.

The length of the carapace varies between 0.49 m and 0.73 m with a mean length of 0.62 m. The carapace lengths are thus in full accordance with those found on the Turkish coast (BARAN & KASPAREK 1989b), but are markedly higher than those found on the North Aegean coast (KASPAREK 1991). Mature and immature (adult and subadult) individuals thus occur in Egyptian waters, as in the Turkish waters. Juveniles as in the Northern Aegean, however, are absent.

5.1.3 Marine turtle catching

In the bazaar of Marsa Matruh, a man had on offer an immature Loggerhead Turtle for sale. It was kept alive within a plastic bowl and the man had written his name onto the carapace with white colour. The same salesman also had several land tortoises for sale.

Tab. 4. Dead marine turtles which were found washed ashore during the 1993 survey between Alexandria and El-Salum. The table gives the location (region and beach number), the date and the curved carapace length.

| region | beach no. | date | carapace length |
|-------------------|-----------|----------|-----------------|
| Arabs Gulf | 1.17. | 08.07.93 | 0.53 m |
| Arabs Gulf | 1.20. | 08.07.93 | 0.49 m |
| Gulf of Hekma | 2.3. | 06.07.93 | - |
| Marsa Matruh West | 4.12. | 29.06.93 | 0.62 m |
| Marsa Matruh West | 4.16. | 30.06.93 | 0.62 m |
| Marsa Matruh West | 4.17. | 30.06.93 | 0.73 m |
| Gulf of Salum | 5.4. | 03.07.93 | 0.72 m |

In the basin of Marsa Matruh, a man had on offer an immature Loggerhead Turtle for sale. It was kept alive within a plastic bowl and the man had written his name onto the carapace with white colour. The same salesman also had several land tortoises for sale.

There are no important fishing grounds in the study area. The only fishing harbours are Alexandria and Marsa Matruh. Some fishermen also work at El-Salum. We learnt from fishermen and other local people that marine turtles are caught only accidentally. However, when they are caught they are brought to the fish market of Alexandria for sale. This includes turtles caught at Marsa Matruh. They are not on offer for sale, as customers cannot be found there.

At Alexandria, only a few people buy turtle meat for consumption. It has been suggested by GOODMAN (in: GROOMBRIDGE 1990) that the consumption of marine turtles is related to coptic communities. All people interviewed by the survey teams denied such a relation.

The same is said to be true not only for consumption of turtle meat, but also for the drinking of turtle blood. This custom is occasionally practiced by women as they believe that turtle blood increases the fertility and by men as they believe it to be an aphrodisiac. The neck of the turtle is cut and a tube inserted. Blood drinking is done in public in the fish market.

5.1.4 Discussion

There are so many beautiful beaches on the coast between Alexandria and El-Salum which look to the human eye well suitable for marine turtle nesting. However, only an extremely low number of nesting turtles was found compared with other areas in the Eastern Mediterranean (Turkey, Greece). Possible reasons for this phenomenon should be discussed here.

a) "The survey was not carried out during the peak nesting season and therefore, only a few nesting turtles were found." As Western Egypt has a Mediterranean climate similar to that at important nesting areas in Turkey and Greece, a similar nesting period can be expected. The survey teams held many interviews with local people and in particular with soldiers and coast guards who live on the beaches for several months a year and all of them confirmed the results, i.e. they confirmed that the survey was carried out during the main nesting season.

b) "Egypt is outside the distribution area of marine turtles." Marine turtle nesting is only known in the Eastern Mediterranean, significant nesting does not occur in the Western Mediterranean. It may be discussed whether Western Egypt is situated already outside the natural boundaries of the distribution of the Loggerhead Turtle and the Green Turtle. However, there is an important nesting beach of the Loggerhead Turtle in the Kouf National Park in Libya (SCHLEICH 1987, see also for example GROOMBRIDGE 1990) which is situated some 400 km west of the Egyptian-Libyan border. That means that Western Egypt is situated well within the natural boundaries of the distribution.

c) "The beach material is not suitable for marine turtle nesting." In contrast to all other known marine turtle beaches in the Mediterranean, the West Egyptian coast is completely composed of white grains which are made up essentially of carbonate (CaCO_3 sands). These grains are poorly cemented by widely spaced needle-like crystals of calcite causing friability of rock. The West Egyptian sands are thus calcareous rather than siliceous as everywhere else. We do not know the difference between these sands in thermic conductivity, but we can speculate from the white appearance of the sands, that most of the sunlight is reflected rather than absorbed. A lower temperature of the sand, in particular of the underground layers would be the result. The subsurface temperature of the calcareous sands of Western Egypt may thus be too low for successful breeding of turtle eggs.

d) "The sea off the Western Egyptian coast does not provide enough diet for marine turtles and therefore they avoid this area". There is no significant area of shallow sea in front of the coastline. The 10 m isobathe (i.e. the line of equal sea depth) is shown on the charts which show the position and numbers of all beaches (see Appendix). From there, we understand that shallow sea of significant size is found only in the Arabs Gulf. Sea grass agglomerations on the shore were found only on beaches no. 1.6., 2.4., 4.9., 4.15., 4.16., 4.17., 5.3. and 5.5., thus indicating that there are not many sea grass beds off the coast. This is without doubt the reason that the Green Turtle does not occur in this part of the Mediterranean. The Green Turtle is the only herbivorous marine turtle and its occurrence in Turkey (and Cyprus) is confined to regions with large areas of shallow sea (BARAN & KASPAREK 1989a). The occurrence of the Loggerhead Turtle, however, in the sea off the Western Egyptian coast was confirmed during this survey by the catches of fishermen and by the presence of dead individuals washed ashore.

e) "The sands of the Western Egyptian coast are too wet for marine turtle nesting". The most frequent wind direction is north and north-west which therefore is mostly inshore. During periods of high tide, in particular, the strong inshore winds contribute to very strong wave action over many beaches and this may help destroy buried turtle clutches. Although we believe that this factor is not the main reason for the low frequency of nesting marine turtles in the study area, it may have some influence.

5.2 Coastal habitats and factors threatening them

5.2.1 Sand dunes

The coastal limestone formation with overlying sand dunes are a unique feature in the Mediterranean. This formation extends from Alexandria to some kilometres before El-Salum, i.e. over almost the whole study area. Many parts of the sand dunes are still unspoilt. The military restrictions limit the access even for local people. Access is completely forbidden between dusk and dawn. However, rapid tourist development is taking place and this will reduce the restrictions and bring much disturbance to the coastal dunes.

A) Undeveloped and lightly developed beaches. A list is given here of those beaches which are not influenced by tourist or other development including those with only light influence.

region 1: 1.24.

region 2: 2.1., 2.2., 2.3., 2.4., 2.5., 2.6.

region 3: 3.3., 3.4.,

region 4: 4.1., 4.6., 4.7., 4.8., 4.9., 4.10., 4.11., 4.12., 4.13., 4.14., 4.15., 4.16., 4.17., 4.18.

region 5: 5.1., 5.2., 5.3., 5.4., 5.5., 5.6., 5.7., 5.8.

B) Beaches influenced by human development. A list is given here of those beaches on which some development is already going on, but which has not yet reached a stage as on beaches of category C.

region 1: 1.2., 1.3., 1.8., 1.9., 1.11., 1.12., 1.13., 1.14., 1.15., 1.16., 1.17., 1.18., 1.20., 1.22.

region 2: -

region 3: 3.5.

region 4: 4.2., 4.3., 4.5.

region 5: 5.9.

C) Tourist beaches. A list is given here of those beaches which are used completely or overwhelmingly for tourism or other development:

Tab. 5. The status of development of the Mediterranean coast between Alexandria and El-Salum in 1993. Development is divided into three groups (no development, modest development and heavy development) and the table gives the number of beaches and their total length by region.

| region | none | | modest | | heavy | |
|------------|-----------|--------------|-----------|-------------|-----------|-------------|
| | no. | km | no. | km | no. | km |
| 1 | 2 | 23.5 | 14 | 42.6 | 9 | 45.5 |
| 2 | 6 | 21.0 | 0 | 0 | 1 | 5.0 |
| 3 | 2 | 6.0 | 1 | 20.0 | 2 | 5.6 |
| 4 | 14 | 48.3 | 3 | 8.8 | 1 | 2.5 |
| 5 | 8 | 39.0 | 1 | 6.0 | 1 | 0.5 |
| sum | 32 | 137.8 | 19 | 77.4 | 14 | 59.1 |
| % | 49 | 50.1 | 29 | 28.3 | 22 | 21.6 |

region 1: 1.1., 1.4., 1.5., 1.6., 1.7., 1.10., 1.19., 1.21., 1.23.

region 2: 2.7.

region 3: 3.1., 3.2.

region 4: 4.4.

region 5: 5.10.

From the list and the table below which summarizes these results one understands that about half of all beaches are still unspoilt, free of tourist or other development. Development has already started at roughly 30% of the beaches and about 20% of all beaches have already been developed.

Most of the beaches which are still unspoilt are situated in the western half of the study area, i.e. in the regions of Marsa Matruh West and in the Gulf of Salum. The heaviest development has taken place in the Arabs Gulf, i.e. close to Alexandria.

5.2.2 Coastal lagoons

There is a small lagoon at the tip of Ras El Daba (see beach no. 2.1.) and another at the tip of Ras Hawala (beach no. 3.3.). There was a rich bird life in the lagoons including breeding Kentish Plovers at Ras El Daba lagoon and a colony of Little Terns at Ras Hawala lagoon.

The largest lagoon is situated at Marsa Matruh. It is, however, completely developed. The town of Marsa Matruh covers a great part of the lagoon's shores. Regarding nature conservation, this lagoon is already lost.

Large areas of the depression between the coastal ridge and Abu Sir ridge are filled with water after rainfalls in winter. Extensive beds of halophyte vegetation can be found there. Being outside the scope of the survey, this area could not be covered.

5.2.3 Wild life

The sand dunes and limestone formation support fascinating wildlife. Unfortunately, due to the danger to life because of the many mines from World War II which are still present in the sand dunes, the team was not able to study this habitat in detail. Nevertheless, we saw some interesting species.

M a m m a l s

There is a relatively high number of mammals which occur in the coastal belt between Alexandria and El-Salum. OSBORN & HELMY (1980) listed records of 27 species.

Hemichinus auritus libycus (Ehrenberg, 1833)

Paraechinus deserti deserti (Loche, 1858)

Crocidura suaveolens matruhensis Setzer, 1960

This subspecies is endemic to the Western Egyptian coast. Marsa Matruh is so far the only locality where it has been found. It bears the name of Marsa Matruh.

Lepus capensis rothschildi (De Winton, 1902)

Gerbillus perpallidus Setzer, 1958

Gerbillus andersoni inflatus (Ranck, 1968)

Gerbillus gerbillus gerbillus (Olivier, 1801)

Dipodillus campestris wassifi (Setzer, 1958)

Dipodillus simoni kaiseri (Setzer, 1958)

Dipodillus amoenus amoenus De Winton, 1902

Dipodillus henleyi henleyi De Winton, 1903

Meriones shawi isis (Thomas, 1919)

Pachyuromys duprasi natronensis De Winton, 1903

Psammomys obesus obesus Cretzschmar, 1828

Spalax ehrenbergi aegyptiacus (Nehring, 1898)

Rattus rattus (Linnaeus, 1758)

Mus musculus praetextus (Brants, 1827)

Eliomys quercinus cyrenaicus (Festa, 1921)

Allacata tetradactylus (Lichtenstein, 1823)

Jaculus orientalis orientalis Erxleben, 1777

Jaculus jaculus flavillus Setzer, 1955

Canis aureus lupaster (Hemprich and Ehrenberg, 1833)

Vulpes vulpes aegyptiaca (Sonnini, 1816)

Foxes were recorded in the sand dunes and limestone ridges several times during the survey and also fox tracks were seen at a number of localities.

Poecilictis libyca libyca (Hemprich and Ehrenberg, 1833)

Herpestes ichneumon ichneumon (Linnaeus, 1758)

Felis chaus nilotica De Winton, 1898

Acinonyx jubatus (Schreber, 1776)

The most recent record is from 1964.

Monachus monachus

It should be noted that Monk Seals were not encountered during the survey and no tracks of Monk Seals were found on the sand. Also our interviews with fishermen and other local people did not result in an indication of an occurrence of Monk Seals in Egyptian waters. One of the reasons may be that coastal rocks are rather low lying almost everywhere and no coastal caves were to be seen.

Birds

The ornithological knowledge of the coast between Alexandria and El-Salum is very poor. The area between Alexandria and Marsa Matruh has hardly been visited by birdwatchers and the area between Marsa Matruh and El-Salum may never have been visited by birdwatchers (GOODMAN & MEININGER 1989). The coastal area is thus much less known than e.g. inland oases to the south of the coast (cf. GOODMAN, MEININGER & MULLIE 1986).

The survey was carried out during the breeding season of the birds. An ornithological survey may give completely different results, when carried out during the migration periods. All water birds seen along the shore during the survey were recorded systematically. However, to get a complete picture of the birds of the wetland one should also include the flat salt lakes to the rear of the coastal limestone ridge. It seems that there is considerable interchange between the coast and the lakes.

The most surprising result is the regular presence of Greater Sand Plovers. A total of 59 birds were recorded mainly on those beach sections with flat beach rocks. There is no positive documentation of breeding of the Greater Sand Plover in Egypt, but there is a record that it has bred at Marsa Matruh in the 1940's (GOODMAN & MEININGER 1989). The flat salt lakes between the coastal ridge and Abu Sir Ridge provide an excellent habitat for Greater Sand Plovers. There is no reason to doubt

Tab. 6. Shore birds observed during the coastal survey between Alexandria and El-Salum in 1993.

| | region number | | | | |
|--|---------------|---|----|----|----|
| | 1 | 2 | 3 | 4 | 5 |
| Squacco Heron, <i>Ardeola ralloides</i> | 2 | - | - | - | - |
| Common Sandpiper, <i>Actitis hypoleuca</i> | 3 | 2 | 2 | 1 | 17 |
| Green Sandpiper, <i>Tringa ochropus</i> | - | - | 4 | 2 | 9 |
| Wood Sandpiper, <i>T. glareola</i> | - | - | 1 | - | - |
| Redshank, <i>T. totanus</i> | - | - | - | 2 | 40 |
| Kentish Plover, <i>Charadrius alexandrinus</i> | 5 | 3 | - | 21 | 6 |
| Greater Sand Plover, <i>Ch. leschenaultii</i> | 4 | 4 | 5 | 35 | 11 |
| Little Tern, <i>Sterna albifrons</i> | 9 | - | 30 | - | - |
| Common Tern, <i>S. hirundo</i> | - | - | - | 1 | 2 |
| Yellow-legged Gull, <i>Larus cachinnans</i> | 3 | 1 | 4 | 2 | 2 |

that it actually breeds there and comes to the sea shore after breeding is finished. This would represent the westernmost breeding area of the Greater Sand Plover and the only one in Africa.

On the other hand, the number of gulls and terns was relatively low. Only Common and Little Terns were seen and Yellow-legged Gulls were the only gulls. Their total number was only 12!

Reptiles

A list of reptiles is given here which occur in the study area. MARX (1968) has been used as a reference source. Comments were added to those species which were recorded in the 1993 marine turtle survey. Those species which occur in northwestern Egypt, but have not yet been recorded in the coastal area, were marked with a cross ("+").

- Hemidactylus turcicus* (Linnaeus, 1758)
- Ptychodactylus hasselquisti* (Donndorff, 1798) +
- Stenodactylus petrii* Anderson, 1896 +
- Stenodactylus stenodactylus* (Lichtenstein, 1823)
- Tarentola annularis* (Geoffroy, 1823) +
- Tarentola mauritanica* (Linnaeus, 1758)
- Agama agama spinosa* Gray, 1931

Agama mutabilis (Merrem, 1820)

An individual of the Changable Agama which is a typical desert species was observed west of Marsa Matruh. It was extremely tame. FLOWER (1933) reported that

it is common in spring by late May and in autumn from the early November. In summer they appear to hide underground.

Laudakia stellio (Linnaeus, 1758)

Several Starred Agamas were observed on limestone walls near Burg al Arab.

Acanthodactylus boskianus (Daudin, 1802)

Bosc's Lizard with its spiny comblike scales on its digits is best adapted for a life in sandy areas as on dunes or beaches. We found it several times in the dunes and limestone ridges. A specimen was collected at Marsa Matruh for identification and is now in the collection of the Senckenberg Museum, Frankfurt.

Acanthodactylus pardalis (Lichtenstein, 1823)

Acanthodactylus scutellatus (Audouin, 1829)

Mesalina guttulata (Lichtenstein, 1823)

The Small-spotted Lizard is not uncommon in the sand dunes and on the limestone rocks. It is often seen in areas without any vegetation. It hides there under stones. A specimen from the west of Alexandria was preserved for identification and is now in the collection of the Senckenberg Museum, Frankfurt.

Eremias rubropunctata (Lichtenstein, 1823)

Ophisops elegans (Menetries, 1832)

Varanus griseus (Daudin, 1803)

Chalcides ocellatus (Forskal, 1775)

Chalcides sepsoides (Audouin, 1827)

Eumeces schneideri (Daudin, 1802)

A single individual was found near the coast to the north of Fuka.

Mabuya quinquetaeniata (Lichtenstein, 1823)

Scincus scincus (Linnaeus, 1758)

Chamaeleo chamaeleon Linnaeus, 1758

One specimen of the European Chamaeleon was caught east of Marsa Matruh when it was crossing the road.

Eryx colubrinus (Linnaeus, 1758)

Eryx jaculus (Linnaeus, 1758)

Coluber florulentus Geoffroy, 1827 +

Coluber rogersi (Anderson, 1893)

Lytorhynchus diadema (Dumeril and Bibron, 1854)

Macroprotodon cucullatus (Geoffroy, 1827)

Malpolon moilensis Reuss, 1834

Malpolon monspessulanus (Geoffroy, 1827)

Psammophis schokari (Forskal, 1775)

Psammophis sibilans (Linnaeus, 1758) +
Spalerosophis diadema (Schlegel, 1837)
Naja haje (Linnaeus, 1758)
Cerastes cerastes (Linnaeus, 1758) +
Cerastes vipera (Linnaeus, 1758)

Testudo kleinmanni (Lortet, 1883)

Several Egyptian Tortoises were seen to be offered for sale on the market of Marsa Matruh. Without doubt, they stem from the surroundings of the town. This small tortoise is the only land tortoise living in Egypt.

A m p h i b i a n s

Bufo regularis Reuss, 1834

Bufo viridis Laurenti, 1768

An individual was seen near Burg el Arab.

I n s e c t s

Scarabaeus sacer was twice found in the sand dunes.

5.2.4 Pollution

The whole coast was extremely polluted with crude oil washed ashore. There was no beach or beach section without tar balls along the shore. Some of these beaches (beaches no. 4.13. and 4.15.) were covered with a layer of tar and it is recommended that cleaning them should be a priority. On beach no. 3.3, a Little Tern (*Sterna albifrons*) was observed which was almost completely black, as a result of all the feathers being polluted with oil.

The Egyptian coast is also badly polluted with plastics washed ashore. There are all kinds of plastic wrappings, boxes, bottles and bags. From the inscriptions on plastic bags and wrappings, it would seem that most of the rubbish comes from Egypt, Italy and Greece.

6 Legal Aspects of Turtle Conservation in Egypt

Egypt is Party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 4 January 1978 (accession). All marine turtles are listed in Appendix I of CITES. It should be stressed that CITES not only forbids the international trade with endangered species, but also the import of specimens from the sea without prior permit.

Egypt is Party to the African Convention since 12 May 1972. All marine turtles are listed in Class A of the Annex to the African Convention, and are thus deemed to be totally protected. Domestic and international trade in marine turtles is prohibited except under a permit.

Egypt has signed the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). All marine turtles in the Mediterranean are included, as migratory species in danger of extinction, in Appendix I. Parties are obliged to provide such species with strict protection.

Egypt has ratified the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention) on 24 August 1978 and Specially Protected Areas Protocol on 8 July 1983. Marine turtles are amongst the highest priorities for action during the period 1985-1995 (Genoa declaration, 9-13 September 1985). So far, no Specially Protected Area has been designated, but there are efforts to protect Ras el Hekma, which is situated in the study area, under this regulation.

The responsibility for the conservation of the coastal ecosystem and of marine turtles lies in the hands of the Egyptian Environmental Affairs Agency (EEAA), Cairo.

Although the ratification acts constitute a national legislation, it is proposed to enforce this legislation by new specific laws for the prohibition of the capture of marine turtles and for the preservation of nesting beaches. It is also recommended to add marine turtles on the list of protected species in Egypt.

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Part II

Inventory of the beaches between Alexandria and El-Salum

Remarks

This inventory was not only prepared for the purpose of marine turtle protection, but it gives a complete overview over all sandy beaches of Western Egypt with their geological and topographic characteristics, their plant cover and wildlife and their human use. The inventory describes the present status of the coastal ecosystem. As rapid development of the coastal region is taking place, this document should be up-dated at regular intervals. The beach inventory may and should be used by coastal planners, conservationists and decision-makers as a basis for controlling the coastal development and for further studies.

The inventory covers practically all beaches on the coast between Alexandria and the Egyptian-Libyan border. All flat coastal strips which consist of loose material have been treated as beaches. This definition thus includes all coasts which do not consist of rocks. From the beginning, there was no confinement to sandy beaches. One thus now has the guarantee that no turtle site has been overlooked because the spectrum of habitats was insufficiently known. All beaches, even if they looked like less favourable or unfavourable turtle nesting habitats, were surveyed.

Arrangement of the inventory

ID-Number: For each beach, an identification number was given, of which the first digit indicates the region. The second number gives the number of the beach within each region. All beaches were numbered from the east to the west. For example, beach no. 2.11. (39) means that the beach is situated in region no. 2, which is the Gulf of Hekma. There, it is the 11th beach counted from the east to the west. The number in brackets is only for internal use and shows the sequence in which the beaches were surveyed. In our example, it was the 39th beach which was surveyed during the project period. When possible, natural landmarks like rock formations or roads, military observatories, buildings etc. were used for dividing the coast into beach sections. As these often had to be created during the first survey without knowing the beach in total, some borders could now, with a much wider knowledge, be better defined.

Explanation: Reasons are given here, why the beach was divided into sections in this way.

Co-ordinates: The geographic co-ordinates of the beach have been given in order to allow an unequivocal identification. The co-ordinates always refer to the centre of the beach.

Beach length: The beach length given here is the result of cartographic measures (mostly from the 1:100,000 topographic map) and estimates in the field. Estimates were necessary in particular for short beaches which are not shown on the map with a sufficient accuracy and for beaches with no landmarks which are shown on maps.

Beach width: The width of the beach refers to the width of the dry, naked sand. It thus does not include the sand dunes and the splash zone which is regularly inundated by the waves. The mean width is given. If the beach width varies strongly within a beach, the maximum and minimum width is given.

Description: This chapter contains some basic information on the beach structure like texture, incline etc. A classical coast consists of sea - splash zone - beach - dunes - inland landscape. Usually, one can understand from the description alone whether a beach is suitable for turtle nesting or not.

Land use: The human influence on the beach is described here. Continuous influences through buildings are treated here and also temporary effects from people bathing, boats, fishermen, etc. If available, this section includes information on the proposed future use of the beach. Military posts (coastal guards) which are found everywhere along the coast (usually in distances of 6-8 km from each other) were not mentioned here.

Pollution: Information on pollution refers only to visible pollution. It has to be emphasized that the bulk of pollutants are not visible to the human eye.

Turtle situation: All data available on the occurrence of marine turtles are presented in this chapter. If any information previous to the 1993 survey from unpublished sources (interviews with fishermen and local people) was available, this has been included, too.

Nesting potential (= marine turtle nesting potential): An attempt was made, to decide whether a beach is well suitable, suitable or not suitable for marine turtle nesting. This decision must always be subjective. At least one reason for this decision is given. For example, when the beach was crowded with tourists and many tourist developments were situated to the rear of the beach, it was not checked whether the beach substrate (sand, shingle) would allow turtle nesting.

Fauna: When available, data on animal species other than marine turtles have been included here.

Miscellaneous: Room is available here for different subjects, e.g. presence of seaweed on the beach.

Protection: Whether the beach is already protected through legislation.

Recommendations: Recommendations for the conservation of certain beaches are given here. The recommendations are not only based on marine turtle data, but include other animals, the sand dune ecosystem and the natural beauty of an area.

1 Arabs Gulf

ID-number: 1.1. (1)

Explanation: This beach is situated at the western end of Alexandria bordering a suburban area. Being a tourist beach, it was not controlled completely, but only a 3 km long stretch west of Burg Abu Sir.

Co-ordinates: 31°03'N 29°41'E

Beach length: c. 10 km

Beach width: 30 m

Description: The beach consists of fine, white sand and slopes gently to the sea.

Land use: The beach is used 100% for tourism. Tens of thousands of tourists use the beach during summer for recreation and beach umbrellas and deck-chairs are seen everywhere. A row of houses including summer houses, high-rise buildings, restaurants etc. are situated at the rear of the beach.

Pollution: The sea water had a greenish colouration and showed evidence of increased eutrophication, as a result of organic sewage outfalls from the tourist developments. This in turn would increase algal production in the area. Some litter was present everywhere between the tourists.

Turtle situation: -

Nesting potential: Although physically suitable for marine turtle nesting, the tourism development does not allow significant turtle nesting.

Protection: None.

ID-number: 1.2. (2)

Explanation: The beach extends from a military post at the road sign "251 km to M. Matruh" in the west to the beginning of a row of houses in the east.

Co-ordinates: 31°01'N 29°36'E

Beach length: 2.0 km

Beach width: 30 m

Description: The beach consists of a very fine, dry sand, but it becomes somewhat rocky to its rear. Sand dunes and limestone formations are situated in the hinterland.

Land use: A few long-line fishermen were present on the beach.

Pollution: There was only little plastic rubbish washed ashore. The sea water was not very clear, indicating some pollution (cf. beach 1.1.).

Turtle situation: -

Nesting potential: The beach would be very suitable for marine turtle nesting.

Protection: None.

ID-number: 1.3. (3)

Explanation: The beach extends from a military post at the road sign "251 km to M. Matruh" in the east to the construction site of a large hotel complex in the west.

Co-ordinates: 31°00'N 29°36'E

Beach length: 5.5 km

Beach width: 30-50 m

Description: The beach consists of very fine grained, almost white sand. The slope to the sea is rather steep, and often step-like (up to three steps) in the splash zone, but it becomes rather flat further to the rear. At a few places, the beach widens up to 100 m. Extensive sand dunes and limestone formations are found to the rear of the beach.

Land use: Two large-scale construction sites of holiday resorts were found at this beach section. A few long-line fishermen and some tourists come onto the beach on weekends.

Pollution: The pollution by plastic rubbish was moderate.

Turtle situation: A dead Loggerhead Turtle, *Caretta caretta*, was found on the shore. Its carapace length was 0.9 m. Her neck was apparently cut by human beings.

Nesting potential: The beach would be well suitable for turtle nesting, although the beach resorts will bring much disturbance after completion.

Protection: None.

ID-number: 1.4. (4)

Explanation: According to the road signs, the beach extends from km 245.5 to km 242.0 from Marsa Matruh.

Co-ordinates: 31°00'N 29°32'E

Beach length: 3.5 km

Beach width: 20-30 m

Description: The beach forms the continuation of beach no. 1.3. and should be treated as a unit. The sand here is extremely fine-grained and the slope of the beach to the sea is medium. Sand dunes and limestone formations are found to the rear of the beach.

Land use: There are many construction sites of holiday houses and villages scattered over the beach.

Pollution: The pollution by plastic rubbish is medium.

Turtle situation: -

Nesting potential: The beach would be suitable for marine turtle nesting.

Fauna: Three Hoopoes were seen in the garden of a holiday house.

Protection: None.

Recommendation: The beach may be a buffer zone for a protection area in beaches no. 1.2.-1.3.

ID-number: 1.5. (62)

Explanation: The beach extends from the President's Residence in the west to the border of beach no. 1.4. in the east.

Co-ordinates: 30°59'N 29°33'E

Beach length: 5.0 km

Beach width: 60 m

Description: The beach consists of very fine sand and is gently sloping from the sea. However, there is a step-like slope some 25 m behind the splash line.

Land use: Tourist beach. About one fourth of the beach consists of almost finished holiday houses, one fourth of inhabited holiday houses, one fourth of construction sites and the rest is not built on. The beach has been flattened by man in front of the inhabited holiday houses. Sun roofs made of palm leaves are found along the beach. Rubble has been deposited on the beach in front of the construction sites. A few long-line fishermen were present on the beach.

Pollution: Plastic rubbish is present all along the beach, but not in front of the holiday houses, where it seems to be regularly collected by man. Some crude oil is found on the beach. The sea water is not very clear indicating some pollution. Two dead cows were lying on the beach.

Turtle situation: -

Nesting potential: The beach would be physically suitable for marine turtle nesting, but the tourist development is too strong.

Protection: None.

ID-number: 1.6. (61)

Explanation: The beach extends from the President's Residence in the east to El-Zumarada tourist village in the west.

Co-ordinates: 30°57'N 29°30'E

Beach length: 4.0 km

Beach width: 50 m

Description: A very wide beach with a fine to medium-grained sand. The beach slopes gently to the sea. Little is left from the sand dunes to the rear of the beach. The beach in front of a tourist village which is still under construction is still rather unspoilt, but the other parts are heavily influenced by the tourist development.

Land use: An amenity beach. There are two tourist villages (El-Zumarada tourist village and Maraqua village) and another is under construction.

Pollution: Oil pollution in form of tar balls was noted all along the beach and also plastic rubbish was found everywhere.

Turtle situation: -

Nesting potential: The beach is already lost to tourism.

Miscellaneous: Agglomerations of Neptune-grass (*Posidonia oceanica*) were seen on the shore.

Protection: None.

ID-number: 1.7. (60)

Explanation: The beach extends between two holiday resorts which are being constructed.

Co-ordinates: 30°56'N 29°27'E

Beach length: 7.0 km

Beach width: 25-60 m

Description: The beach consists of fine, white sand, but at several places, remains of mussel shells are intermixed thus forming larger particles. In the splash zone, the beach slopes rather steeply, but further to the rear it becomes rather flat and does not rise further. The beach is very broad and extensive sand dunes and limestone formations are situated to its rear. The dunes in the easternmost 3 km are covered with rubble.

Land use: Holiday resorts are being constructed at both ends of the beach and rubble is deposited in the sand dunes. Workers from the construction sites use the beach for swimming.

Pollution: The beach was modestly polluted with tar and plastic rubbish.

Turtle situation: -

Nesting potential: The beach would be very suitable for marine turtle nesting.

Fauna: A Squacco Heron was sitting on the beach and two Kentish Plovers, a Little Tern and a Yellow-legged Gull were noted along the shore.

Protection: None.

ID-number: 1.8. (59)

Explanation: The beach extends between two large tourist resorts.

Co-ordinates: 30°54'N 29°24'E

Beach length: 6.0 km

Beach width: 70 m

Description: An extremely broad beach whose width sometimes reaches even 100 m. Areas where the beach slopes gently change with those where the beach slopes steeply to the sea, but then becomes rather flat. As the tourist resorts are still being under construction, the beach in front of them did not yet suffer.

Land use: There are two large tourist resorts under construction at both ends of the beach; the one in the east covers about 500 m beach length, the other in the east some 2000 m. In addition, there are some holiday houses scattered along the beach.

Pollution: Tar and plastic litter had been washed ashore. A dead cow was lying on the beach.

Turtle situation: -

Nesting potential: The beach would be very suitable for marine turtle nesting.

Protection: None.

Recommendation: The beach between the tourist resorts (c. 4 km) should be protected.

ID-number: 1.9. (58)

Explanation: The beach extends between two holiday resorts.

Co-ordinates: 30°53'N 29°22'E

Beach length: 1.5 km

Beach width: 30 m

Description: The beach slopes to the sea in two steps rather steeply, but then becomes relatively flat. The beach material is fine, almost powder-like sand. Sand dunes and limestone formations form the hinterland of the beach.

Land use: Holiday resorts are being built on both ends of the beach (the one at the western end was almost finished). In particular in the western part of the beach, there were many human footprints in the sand, indicating the use of the beach by tourists on weekends and holidays.

Pollution: There was only a little crude oil, but much plastic litter washed onto the beach.

Turtle situation: -

Nesting potential: The beach would be very suitable for marine turtle nesting.

Protection: None.

ID-number: 1.10. (57)

Explanation: The beach is limited by beaches no. 1.9. and 1.11.

Co-ordinates: 30°52'N 29°20'E

Beach length: 3.0 km

Beach width: 40 m (25-70 m)

Description: The beach is used 100% for tourism. It consists of fine sand and its surface has been adapted to the needs of tourists. A stone mole extends into the sea in the middle of the beach. Some limestone rocks emerge from the beach near its western end.

Land use: Four hotel complexes are situated to the rear of the beach, of which two were operating and two were still under construction. The beach in front of the hotels has been flattened mechanical by caterpillars and its width artificially enlarged up to 100 m. Rubble has been used to fix the sand of the beach.

Pollution: There was only a little tar and plastic rubbish. It seems that the beach has been cleaned by man in front of the already operating hotels.

Turtle situation: -

Nesting potential: The beach is not suitable for marine turtle nesting due to the tourist development.

Protection: None.

ID-number: 1.11. (56)

Explanation: The beach comprises the still undeveloped area between two hotel complexes.

Co-ordinates: 30°52'N 29°19'E

Beach length: 1.5 km

Beach width: 40 m

Description: The beach consists of the typical white sand and slopes gently to the sea. Sand dunes and limestone formations are situated to the rear of the beach.

Land use: A hotel complex at the western border of the beach is being constructed, another at the eastern end is already operating. Some houses are being built at the rear of the sand dunes and of the limestone formation (beach wall). Some long-line fishermen were present.

Pollution: There was little tar and plastic rubbish and a dead cow on the beach.

Turtle situation: -

Nesting potential: The beach would be very suitable for marine turtle nesting.

Fauna: A Little Tern was recorded.

Protection: None.

ID-number: 1.12. (55)**Explanation:** The beach extends from one hotel complex to another.**Co-ordinates:** 30°51'N 29°18'E**Beach length:** 2.0 km**Beach width:** 20 m**Description:** Beach with a white, fine sand. The beach has been changed by man in front of a holiday resort, but is still in a natural state in the western half. There, it slopes gently to the sea with only a low step-like slope in the splash zone. Sand dunes and limestone rocks are found to the rear of the beach.**Land use:** The construction site of a holiday resort covers about half of the beach length. The beach there has been flattened and rolled. Only some rudimentary remains of the original beach and of the sand dunes are available. Some tourists and fishermen were present on the beach. An old large vessel was lying on the beach.**Pollution:** There was some crude oil and plastic rubbish on the shore.**Turtle situation:** -**Nesting potential:** The beach would be less suitable for marine turtle nesting due to the tourist development.**Protection:** None.**ID-number:** 1.13. (54)**Explanation:** The beach is limited by the beaches no. 1.12. and 1.14.**Co-ordinates:** 30°51'N 29°16'E**Beach length:** 2.0 km**Beach width:** 5-30 m**Description:** At the eastern end of the beach, rocks descend to almost the splash line so that the beach width is reduced here to sometimes only 5-10 m. Also at the western end, there is a 300 m long area with rocks. They form an approx. one metre high cliff in the splash zone. Otherwise, the beach consists of fine sand and the slope of the beach to the sea is rather steep. At those parts of the rear of the beach which are not covered by houses, sand dunes are present.**Land use:** There is a newly built holiday resort at the western end of the beach. Holiday houses are scattered over the dune zone of the entire beach length. The beach was used by long-line fishermen.**Pollution:** There was some crude oil and plastic rubbish on the shore.**Turtle situation:** -**Nesting potential:** The suitability of the beach for marine turtle nesting is medium (tourist development, rocks).**Fauna:** A Kentish Plover, four Greater Sand Plovers, three Common Sandpipers and a Little Tern were observed on the shore.**Protection:** None.**ID-number:** 1.14. (53)**Explanation:** The beach extends from El Zaheha Hotel in the east to 4 km further west.**Co-ordinates:** 30°50'N 29°14'E**Beach length:** 4.5 km**Beach width:** 30-70 m**Description:** The beach consists of the typical white, fine sand. In the splash zone, there is often a step-like slope, but then the beach becomes flat. Sand dunes and limestone formations are found at the rear of the beach.**Land use:** The beach in front of the hotel has been flattened and enlarged by caterpillars. Its width here was some 70 m. There were many long-line fishermen on the beach.**Pollution:** There was almost no tar and plastic rubbish on the beach.**Turtle situation:** -

Nesting potential: The beach would be suitable for marine turtle nesting.

Protection: None.

ID-number: 1.15. (52)

Explanation: The beach extends between two holiday villages.

Co-ordinates: 30°50'N 29°11'E

Beach length: 2.1 km

Beach width: 30-100 m

Description: The beach often slopes to the sea in form of a step in the splash zone. The beach material is fine sand and sand dunes and limestone formations are found to the rear of the beach.

Land use: There are two holiday villages at both ends of the beach. It has been flattened in front of the hotels by caterpillars and enlarged so it is up to 100 m wide here. A few long-line fishermen were present on the beach.

Pollution: There was only a little rubbish

Turtle situation: -

Nesting potential: The beach would be less suitable for marine turtle nesting due to the tourist development.

Protection: None.

ID-number: 1.16. (51)

Explanation: The beach extends from the Motel Village Green Beach in the west to 4 km east of it.

Co-ordinates: 30°49'N 29°09'E

Beach length: 4.5 km

Beach width: 30-100 m

Description: The beach consists of fine sand and slopes steeply in the splash zone, but gently further to the rear. There are large, unspoilt sand dunes and limestone formations at the rear of the beach.

Land use: There is a large holiday resort on the western end of the beach. An about 500 m long section of the beach in front of the hotel complex was flattened by caterpillars and enlarged so that the beach width reaches here some 100 m. A few long-line fishermen were present on the beach.

Pollution: Several dead cows were found on the beach. The pollution by tar and plastic rubbish was modest.

Turtle situation: A soldier reported to the survey team that he has seen a marine turtle track 15 days prior to the survey.

Nesting potential: The beach would be very suitable for marine turtle nesting.

Protection: None.

ID-number: 1.17. (50)

Explanation: The beach extends from a hotel in the west to a construction site in the east.

Co-ordinates: 30°49'N 29°07'E

Beach length: 3.5 km

Beach width: 60-80 m

Description: The beach material is a fine white sand. As the beach slopes very gently to the sea, high waves apparently splash over the beach during high tide. Sand dunes and limestone formations at the rear of the beach are relatively low.

Land use: A hotel is situated at the western end of the beach and another is being built at the eastern end. Rubble has been deposited on the beach in front of the construction site, where many people also use the beach for swimming. There are also some tourist facilities like sundecks, sun umbrellas, deck chairs etc. in front of the already operating hotel.

Pollution: The beach was heavily polluted with plastic rubbish, but only with a little tar. The beach in front of the hotel has apparently been cleaned, as there was not pollution at all.

Turtle situation: A dead Loggerhead Turtle, *Caretta caretta*, was found on the beach. Its carapace length was 0.53 m. It had died long before.

Nesting potential: The beach would be very suitable for marine turtle nesting.

Fauna: A Yellow-legged Gull and a Little Tern were recorded.

Protection: None.

ID-number: 1.18. (49)

Explanation: The beach extends from Green Beach City in the west to a hotel complex on the border to beach no. 1.17.

Co-ordinates: 30°49'N 29°05'E

Beach length: 3.0 km

Beach width: 30 m

Description: As the beach slopes very gently to the sea, high waves cover most of the beach during high tide. The sand is rather wet accordingly. The beach material is fine, white sand. Sand dunes with some gravel and limestone rocks are situated at the rear of the beach. The vegetation cover is very sparse.

Land use: There are several holiday houses and hotels along the beach. The beach itself has been prepared to be a public beach and has been flattened. Even sand from other areas has been brought here.

Pollution: There was only very little oil pollution on the beach.

Turtle situation: -

Nesting potential: The beach is still suitable for marine turtle nesting, but as the tourist development is very rapid, this is expected to change completely within the next years.

Fauna: Two Little Terns were recorded.

Protection: None.

ID-number: 1.19. (48)

Explanation: The beach extends between two hotel complexes.

Co-ordinates: 30°49'N 29°03'E

Beach length: 2.0 km

Beach width: 10-20 m

Description: Most of the splash line is covered by beach rocks. They are mostly flat, sometimes they form small cliffs up to one metre high. Only at one place, is there a sandy patch, but the beach at this point is so flat the waves regularly inundate the beach, thus resulting in a wet sand. Sand dunes and limestone rocks are found at the rear of the beach.

Land use: Tourist beach in particular in front of three hotel complexes in the west, in the middle and in the east (Green Beach City).

Pollution: The pollution by crude oil and plastic litter was modest. The beach in front of the hotels had been cleaned.

Turtle situation: -

Nesting potential: Not suited for marine turtle nesting.

Fauna: Three Little Terns were observed.

Protection: None.

ID-number: 1.20. (47)

Explanation: The beach extends between Dream City in the west and a holiday resort in the east.

Co-ordinates: 30°50'N 29°02'E

Beach length: 2.5 km

Beach width: 30 (-80) m

Description: The beach consists of fine white sand and slopes gently to the sea.

Land use: There are tourist resorts on both ends of the beach. The beach in front of "Dream City" was flattened and the vegetation of the sand dunes situated to the rear removed. Thus a tourist beach of approx. 80 m wide was created. Only a few tourists were seen there.

Pollution: There was some plastic litter washed ashore.

Turtle situation: The carapace of a Loggerhead Turtle, *Caretta caretta*, was found by coastal guards and presented to the survey team. Its length was 0.49 m.

Nesting potential: The beach would be very suitable for marine turtles at points away from the tourist resorts.

Protection: None.

ID-number: 1.21. (46)

Explanation: The beach extends from "Dream City" in the east to a small bay in the west.

Co-ordinates: 30°50'N 28°59'E

Beach length: 10.0 km

Beach width: 60-100 m

Description: The beach belongs to a major tourist resort which has altered the natural beach considerably. According to local people, the sand has been covered with a layer of sand brought from another place. The whole beach is very flat.

Land use: There is a major tourist resort on the beach.

Pollution: The beach is cleaned every morning, so that tar and plastics are removed.

Turtle situation: The workers who clean the beach daily claimed that they have never seen marine turtle tracks.

Nesting potential: Tourist beach not suitable any more for marine turtle nesting.

Miscellaneous: This is the only beach, the survey team was not allowed to survey along the West Egyptian coast. However, the beach was inspected from some distance and workers who clean the beach every morning were interviewed.

Protection: None.

ID-number: 1.22. (45)

Explanation: The beach extends from Hotel el Alamein to a holiday resort in the east.

Co-ordinates: 30°59'N 28°45'E

Beach length: 2.0 km

Beach width: 0-80 m

Description: The beach consists of fine, white sand, but there are some rocks scattered over the beach in particular in the middle. The slope of the beach to the sea is very gentle.

Land use: The Hotel el Alamein is situated at the southwestern end of the beach, a holiday village at the northeastern end. The beach in front of the hotel is regularly cleaned and prepared for the tourists' needs. Sun decks, umbrellas, deck chairs etc. are found there. Only a few tourists were present on the beach.

Pollution: There was only very little tar outside the hotel's beach section.

Turtle situation: -

Nesting potential: The beach would be less suitable for marine turtle nesting due to tourist development and the presence of beach rocks in the more remote parts.

Fauna: A Kentish Plover and a Little Tern were observed.

Protection: None.

ID-number: 1.23. (44)

Explanation: The beach extends from a military post on a hill in the west to the beginning of a rocky coast in the east.

Co-ordinates: 31°00'N 28°43'E

Beach length: 1.0 km

Beach width: 40 m

Description: A very wide beach with fine, white sand. The slope to the sea is medium.

Land use: Tourist beach which is directly connected to Sidi Abd el Rahman by an asphalt road. Many holiday villages are being constructed at some distance from the sea.

Pollution: Only very little pollution by crude oil and plastics.

Turtle situation: -

Nesting potential: The beach would not be suitable for marine turtle nesting due to the tourist development.

Protection: None.

ID-number: 1.24. (43)

Explanation: The beach extends from rocks in the west to a hill with a military post near Sidi Abd el Rahman in the east.

Co-ordinates: 31°00'N 28°42'E

Beach length: 3.5 km

Beach width: 10 m

Description: A very narrow beach which is often splashed over by waves. The sand is very fine and large rocks are scattered all over the beach. Sometimes, even steep cliffs are found. A limestone ridge is situated at the rear of the beach.

Land use: None. Many new holiday houses are being built in the flat salt pan at the rear of the limestone ridge.

Pollution: There was some tar and plastic rubbish washed ashore.

Turtle situation: Three tracks of Loggerhead Turtles, *Caretta caretta*, were found: One nest without a track, a track with two attempts of nest building and another with one attempt. All three emergences did not result in successful clutch deposition.

Nesting potential: Despite the record of three marine turtle emergences from the sea, successful turtle breeding seems to be impossible on this narrow, stony beach.

Fauna: A Squacco Heron was recorded.

Protection: None.

2 Gulf of Hekma

ID-number: 2.1. (42)

Explanation: The beach extends from the tip of Ras el-Daba in the west to the beginning of rocks in the east.

Co-ordinates: 31°05'N 28°27'E

Beach length: 0.5 km

Beach width: 20-30 m

Description: The beach consists of white, coarse-grained sand. It is rather wet throughout. High waves seem to splash over the beach. At the rear of the beach, there are two small lagoons with halophyte vegetation, mainly *Salicornia*.

Land use: Local people of el-Daba use the beach for swimming from time to time.

Pollution: Although this beach was much cleaner than most of the other beaches in the study area, there was still some crude oil and plastic rubbish present.

Turtle situation: -

Nesting potential: The beach would be less suitable for marine turtle nesting as the sand is rather wet.

Fauna: Three Kentish Plovers were seen of which at least one had a nest with eggs.

Protection: None.

ID-number: 2.2. (41)

Explanation: The beach extends from the tip of Ras el-Daba in the east to the beginning of a rocky shore in the west.

Co-ordinates: 31°05'N 28°25'E

Beach length: 1.0 km

Beach width: 20 m

Description: The beach consists of fine sand, but large rocks are found everywhere. Flat rocks are frequently covered by a layer of sand. The slope of the beach to the sea is very gentle.

Land use: There were some people on the beach who came for swimming from the surrounding villages (el-Daba etc.).

Pollution: There was some tar and plastic rubbish on the beach.

Turtle situation: -

Nesting potential: The beach is too rocky for significant turtle nesting.

Protection: None.

ID-number: 2.3. (40b)

Explanation: The beach is limited by military posts on both sides.

Co-ordinates: 31°04'N 28°18'E

Beach length: 6.0 km

Beach width: 15 m

Description: A rather narrow, sandy beach which with many rocks intermixed. The sand dunes are relatively low and form a unit with limestone formations.

Land use: No.

Pollution: The beach was polluted with tar and plastic rubbish washed ashore.

Turtle situation: A dead Loggerhead Turtle, *Caretta caretta*, was found on the beach.

Nesting potential: Some zones of the beach without rocks would be very suitable for marine turtle nesting.

Protection: None.

ID-number: 2.4. (39)**Explanation:** The beach extends from a military post in the east to a rocky spit of land in the west.**Co-ordinates:** 31°05'N 28°06'E**Beach length:** 1.5 km**Beach width:** 7-15 m**Description:** The beach consists of fine to coarse-grained sand with intermixed larger pebbles. The beach seems to be regularly splashed over by waves during high tide as the sand was rather wet. The beach slopes steeply to the sea and often step-like and wall-like structures are found in the splash zone. Large rocks form the rear limitation of the beach. A small island is situated off the spit of land.**Land use:** No.**Pollution:** The pollution by crude oil was very heavy in some parts of the beach. The amount of plastic rubbish washed ashore was low.**Turtle situation:** -**Nesting potential:** The beach would be suitable for marine turtle nesting to some degree, but the high moisture of the sand may prevent significant nesting.**Fauna:** A Yellow-legged Gull was recorded on the beach and on the off-shore island, there was a colony (at least 10-20 pairs) of Pigeons.**Miscellaneous:** Large amounts of Neptune-grass (*Posidonia oceanica*) were washed ashore.**Protection:** None.**ID-number:** 2.5. (40a)**Explanation:** The beach extends from a spit of land in the east to a military post in the west.**Co-ordinates:** 31°05'N 28°03'E**Beach length:** 8.0 km**Beach width:** 10-40 m**Description:** Although the coast line is generally straight, there are some small, but deep bays in this coastal area. The beach consists of sand intermixed with eroded mussel shell material and larger pebbles. It generally slopes steeply, step-like to the sea with only a few gently sloping parts. Flat beach rocks are also found at some places. Extensive sand dunes with limestone formations are found to the rear of the beach, but they are lower than usually.**Land use:** None.**Pollution:** Tar and plastic rubbish was found on the beach.**Turtle situation:** -**Nesting potential:** The beach would be suitable for marine turtle nesting.**Fauna:** Two Common Sandpipers were recorded on the coast.**Protection:** None.**ID-number:** 2.6. (38)**Explanation:** The beach extends from flat beach rocks in the west to high cliffs in the east.**Co-ordinates:** 31°05'N 28°00'E**Beach length:** 4.0 km**Beach width:** 17 m**Description:** The beach consists of medium to fine-grained sand, but single rocks are scattered all along the beach. During high tide, waves apparently splash over the beach so that the moisture of the sand is rather high. Extensive sand dunes are found to the rear of the beach, in particular at its western end. At one place, the shifting sand dunes move towards the sea and have already approached the splash line. Sandy hills several metres high emerge from the beach here.**Land use:** None.**Pollution:** Crude oil was noted all along the beach and also some plastic rubbish washed ashore.**Turtle situation:** -**Nesting potential:** The beach would be suitable for turtle nesting.**Fauna:** A *Scarabaeus* beetle and a scorpion were found in the sand dunes.

Protection: None.

Recommendation: The area should be protected because of its unique moving sand dunes.

ID-number: 2.7. (37)

Explanation: The beach extends from Fuka in the west to the beginning of rocks in the east.

Co-ordinates: 31°05'N 27°57'E

Beach length: 5.0 km

Beach width: 0-20 m

Description: The beach consists of medium to fine-grained sand with relatively low sand dunes to its rear. Beach rocks cover some areas, but are completely absent from others.

Land use: The beach is used for the deposition of the waste from a quarry. Sand and grit covers the beach and the dunes over an area of about 800 m and forms an about 2 m high wall against the sea. 3-4 construction sites of holiday houses are situated in the west.

Pollution: The pollution is considerable. Tar balls were scattered along the beach and sometimes they are grouped to form a thin line of oil. There was also rubbish on the beach.

Turtle situation: -

Nesting potential: The beach would be less suitable for marine turtle nesting.

Fauna: Four Greater Sand Plovers were recorded.

Protection: None.

3 Abu Hashafa Bay

ID-number: 3.1. (36)

Explanation: Three small bays are summarized under this heading.

Co-ordinates: 31°14'N 27°52'E

Beach length: 0.2, 0.2 and 0.15 km

Beach width: 15 m

Description: Two of the bays are situated within the boundaries of the village Ras El-Hekma. The slope to the sea is rather steep near the water edge, but becomes rather gentle further to the rear. The other beach is situated near the spit of land; it separates a small lagoon with clear water, Princess' Lake, from the sea. The beach consists of very fine sand.

Land use: Buildings are found at the rear of the beaches situated within Ras el-Hekma. The beach at Princess' Lake (Princess' Beach) was said to be used for recreation, although we did not see tourists there during our visit.

Pollution: None.

Turtle situation: -

Nesting potential: The beaches are too small for significant turtle nesting.

Protection: None.

ID-number: 3.2. (35)

Explanation: The beach extends from Ras Abu Hashafa in the west to a military post in the east.

Co-ordinates: 31°11'N 27°41'E

Beach length: 5.0 km

Beach width: 30 m

Description: The beach consists of very fine sand. Sand dunes to the rear of the beach have been destroyed. A small island is situated opposite to the shore.

Land use: A new recreation resort has recently been finished to the rear of the western half of the beach. It consists of a huge hotel complex and bungalows. Sun umbrellas and deck-chairs are found along the beach. In the eastern half of the beach, there is a large holiday camp. The tents are used mainly by people from Alexandria (University camp).

Pollution: The beach was modestly polluted with crude oil and plastic litter.

Turtle situation: A dead baby Loggerhead Turtle (*Caretta caretta*) was found by tourists and was shown to the survey team.

Nesting potential: Although the beach is physically very suitable for marine turtle nesting, the tourist development would not allow nesting of a significant population.

Fauna: Two Yellow-legged Gulls, five Little Terns and a Pallid Swift were noted along the coast.

Protection: None.

ID-number: 3.3. (34)

Explanation: The beach extends from the tip of Ras Hawala in the west to the beginning of a rocky shore in the east.

Co-ordinates: 31°09'N 27°35'E

Beach length: 3.0 km

Beach width: 30 m

Description: The beach is situated in a bay which extends from the tip of Ras Hawala to the east. It consists of extremely fine sand and slopes steeply to the sea, but becomes flat after some metres. There is some shingle and flat beach rocks in the eastern part of the beach. Sand dunes are found to the rear of the beach. There is a small lagoon with brackish water near the tip of Ras Hawala.

Land use: None.

Pollution: As the bay is in the lee of the prevailing wind directions, the beach was extremely clean with no crude oil or plastic litter.

Turtle situation: -

Nesting potential: The beach would be very suitable for marine turtle nesting.

Fauna: There was a rich bird life in and around the small lagoon, including four Green Sandpipers, one Wood Sandpiper, two Common Sandpipers, one Greater Sand Plover, two Yellow-legged Gulls and 25 Little Terns. One of the Little Terns was almost black as the feathers were heavily polluted with oil.

Protection: None.

Recommendation: The area should be protected because of its high scenic value around Ras Hawala and because of the unspoilt sand dunes.

ID-number: 3.4. (33)

Explanation: The area extends from Ras Hawala in the east to a military post in the west.

Co-ordinates: 31°15'N 27°31'E

Beach length: 3.0 km

Beach width: 35 m

Description: Sandy beach, but there are flat beach rocks in the splash line all along the coast. The sand dunes and limestone formations to the rear of the beach are rather low.

Land use: None.

Pollution: The beach was very heavily polluted with crude oil and plastic litter.

Turtle situation: -

Nesting potential: Marine turtle nesting is almost impossible because of the flat beach rocks.

Fauna: Four Greater Sandpipers and a Kingfisher was observed along the coast.

Protection: None.

ID-number: 3.5. (32)

Explanation: The beach extends from the point where the coastal road approaches the coast in the west to the beginning of a broad sandy beach in the east.

Co-ordinates: 31°15'N 27°25'E

Beach length: 20.0 km

Beach width: 10 m

Description: The beach is very flat and narrow and consists of sand with large pebbles intermixed. To the rear of it, there is a sandy to muddy salt steppe which seems to be inundated by the sea from time to time. The steppe is covered by halophyte vegetation.

Land use: A large beach resort is being constructed. The area in front of the construction site has been flattened by bulldozers in order to meet the tourist needs. Several private summer houses are scattered over the beach.

Pollution: -

Turtle situation: -

Nesting potential: The area is too flat and the sandy beach too narrow for significant turtle nesting.

Protection: None.

4 Marsa Matruh West

Name: Cleopatra beach**ID-number:** 4.1. (5)**Explanation:** The beach is bordered by rocks on both sides.**Co-ordinates:** 31°22'N 27°11'E**Beach length:** 0.8 km**Beach width:** 10-20 m**Description:** The beach consists of white, fine sand and is very flat. Flat beach rocks are found in the splash zone. Some large, steep rocks emerge from the sea near to the coast. Steep sand dunes, including drifting dunes, and limestone cliffs rise at the rear of the beach. The undisturbed dune vegetation seems to develop free of human influence.**Land use:** Two fishermen using hook lines were seen on the beach. Hunting of birds is presumed to occur in the sand dunes due to cartridges found there.**Pollution:** A layer of crude oil was noted on the beach rocks.**Turtle situation:** -**Nesting potential:** Due to the presence of beach rocks, the beach is less suitable for marine turtle nesting.**Fauna:** A Common Tern was observed on the sea, House Sparrows and Crested Larks in the sand dunes. A very rich insect life was noted in the dunes.**Protection:** None.**Recommendation:** The beach should be protected due to its high scenic value and due to the unspoilt sand dunes with a rich wild life.**ID-number:** 4.2. (6)**Explanation:** The beach is limited by a tourist construction in the east and the place, where the beach becomes very narrow, in the west.**Co-ordinates:** 31°22'N 27°08'E**Beach length:** c. 4 km**Beach width:** 30-40 m**Description:** A gently sloping beach consisting of fine sand. High waves seem to splash over the whole beach from time to time, resulting in a relatively wet sand. Unspoilt sand dunes are situated at the rear of the beach.**Land use:** A large tourist complex is under construction at the eastern end of the beach. The sandy beach was flattened and the sand pushed away with bulldozers around the construction site. Footprints of coastal guards and children were noted on the beach. Also dogs seem to be present here.**Pollution:** The beach was polluted with tar balls and plastic rubbish.**Turtle situation:** -**Nesting potential:** The beach would be a suitable nesting habitat for marine turtles. However, the tourist development has reached a critical state.**Protection:** None.**Recommendation:** The extensive sand dunes and the so far untouched parts of the beach should be protected.**ID-number:** 4.3. (7)**Explanation:** The beach extends from El Obayed T.V. station in the west to the place where the beach becomes wider in the east.**Co-ordinates:** 31°23'N 27°08'E**Beach length:** c. 4 km

Beach width: 2-15 m

Description: A very narrow beach, often sharply sloping to the sea. From time to time, the slope was so sharp that parts of the beach have been washed away by the action of the waves and wall-like edges remained. The beach is bordered mostly by rocks to the rear.

Land use: Many holiday houses are being constructed at the rear of the beach, in particular on the western side.

Pollution: The beach was polluted with tar balls and plastic rubbish.

Turtle situation: -

Nesting potential: Not suitable for marine turtle nesting.

Protection: None.

ID-number: 4.4. (8)

Explanation: The northern end of the beach is marked by high cliffs.

Co-ordinates: 31°24'N 27°04'E

Beach length: 2.5 km

Beach width: 0-20 m

Description: The beach consists of very fine sand and slopes gently to the sea. Thus, almost the whole beach will be inundated during high water level (high tide). At the northern end, high sand dunes and white cliffs increase immediately behind the splash line.

Land use: The whole beach is used for tourism. Many beach houses, holiday resorts etc. are found here, but most of them are still under construction.

Pollution: The beach was somewhat polluted with crude oil washed ashore.

Turtle situation: -

Nesting potential: The beach would be physically suitable for turtle nesting, but the tourist development would not allow nesting in significant numbers.

Protection: None.

ID-number: 4.5. (9)

Explanation: The beach is limited by high cliffs in the west and east.

Co-ordinates: 31°24'N 27°03'E

Beach length: 0.8 km

Beach width: 10 m

Description: The beach consists of fine sand which is intermixed with large pebbles and rocks. Large limestone rocks interrupt the beach at several places and also form the eastern and western ends.

Land use: A beach resort is situated at the rear of the beach.

Pollution: The beach was slightly polluted with crude oil washed ashore. Some litter including light strips were seen on the beach.

Turtle situation: -

Nesting potential: The beach is less suitable for marine turtle nesting due to the rocks and large pebbles along the shore.

Protection: None.

ID-number: 4.6. (10)

Explanation: The beach is limited by rocks to both ends.

Co-ordinates: 31°25'N 27°01'E

Beach length: 1.0 km

Beach width: 20 m

Description: The beach material is a fine, almost white sand. In the east, the beach gently slopes to the sea. In the west, there are many flat beach rocks. Some rocks emerge from the sea in front of the shore line. Limestone rocks and sand dunes are found at the rear of the beach.

Land use: None. Some dog tracks were seen on the beach.

Pollution: The beach was slightly polluted with crude oil (tar balls) and plastic litter.

Turtle situation: -

Nesting potential: Due to the beach rocks and the small length of the beach, it would be less suitable for turtle nesting.

Fauna: A Fox was observed in the sand dunes and Crested Larks were singing there.

Protection: None.

ID-number: 4.7. (11)

Explanation: The beach is limited by rocks in the east and west.

Co-ordinates: 31°29'N 26°46'E

Beach length: 1.0 km

Beach width: 30 m

Description: The beach consists of fine sand. As the slope to the sea is very gentle, waves apparently go over the beach from time to time. Limestone rocks are situated to the rear of the beach and form a back limitation. A coastal road runs parallel to the beach.

Land use: None.

Pollution: The beach was somewhat polluted with crude oil.

Turtle situation: Three tracks of Loggerhead Turtles were found on the beach on 28 June 1993. One of the tracks lead to a nest. The other tracks were apparently false crawls, but clutch deposition cannot be ruled out definitively.

Nesting potential: The beach is a suitable nesting habitat for marine turtles. As the total beach length is only 1 km, it cannot hold a large population of turtles.

Protection: None.

Recommendation: The beach should be protected.

ID-number: 4.8. (12)

Explanation: The beach is limited by rocks on both sides. A military post is found at the eastern end.

Co-ordinates: 31°29'N 26°39'E

Beach length: 2.0 km

Beach width: 20-30 m

Description: The beach slopes mostly gently to the sea, but in places there is a step-like increase. The beach material is fine, white sand. White limestones and sand dunes are situated in the rear of the beach.

Land use: There is no human use apart from a military post above the shore.

Pollution: The beach is slightly polluted with crude oil and some plastic litter.

Turtle situation: One track of a Loggerhead Turtle, *Caretta caretta*, was found on the beach on 28 June 1993. There was a nest along the track and clutch deposition was apparently successful.

Nesting potential: The beach would be suitable for a large nesting population of marine turtles.

Fauna: A Greater Sand Plover, a Kentish Plover, a Yellow-legged Gull and a Pallid Swift were recorded.

Protection: None.

Recommendation: The beach should be protected because of its fine, unspoilt sand dunes and its potential for marine turtle nesting.

ID-number: 4.9. (13)

Explanation: The beach extends between rocks on both sides.

Co-ordinates: 31°29'N 26°35'E

Beach length: 1.0 km

Beach width: 15 m

Description: The beach is relatively narrow and from time to time, it seems to be washed over by high waves during high tide. The material is a white, fine sand with some shingle intermixed. Sand dunes are found to the rear of the beach.

Land use: None.

Pollution: The pollution of the beach with crude oil is medium.

Turtle situation: None.

Nesting potential: The beach is less suitable for marine turtle nesting, as it is relatively narrow and washed over by high waves.

Miscellaneous: Much Neptune-grass (*Posidonia oceanica*) was lying on the beach. It covered most of the sand.

Protection: None.

ID-number: 4.10. (14)

Explanation: The eastern border of the beach is the Dawia military post. The beach section ends 1 km west of it, where it becomes wider.

Co-ordinates: 31°30'N 26°31'E

Beach length: 1.0 km

Beach width: 0-10 m

Description: A very narrow sandy beach. At the rear of the beach, a row of large rocks is found, behind which a limestone formation rises which is partly covered with sand.

Land use: None.

Pollution: Tar balls were found all along the beach.

Turtle situation: -

Nesting potential: The beach is too narrow for marine turtle nesting.

Protection: None.

ID-number: 4.11. (15)

Explanation: The beach extends from the border of beach no. 4.10. in the east to Kom Marzoke military post in the west.

Co-ordinates: 31°30'N 26°30'E

Beach length: 4.0 km

Beach width: 20-30 m

Description: A beach consists of fine, white sand. The slope to the sea is gentle. Flat beach rocks are found at some places. Large sand dunes form the rear of the beach.

Land use: None.

Pollution: There was some rubbish on the beach washed ashore.

Turtle situation: -

Nesting potential: The beach would be very suitable for marine turtle nesting.

Fauna: Three Greater Sand Plovers and some Swallows were observed.

Protection: None.

Recommendation: The area should be protected because of its unspoilt sand dunes.

ID-number: 4.12. (16)

Explanation: The beach is limited by the Kom Marzoke military post in the east and ends 1 km west of it.

Co-ordinates: 31°30'N 26°28'E

Beach length: 1.0 km

Beach width: 30 m

Description: A fine, sandy beach with extensive sand dunes to the rear. The slope of the beach to the sea is generally medium; however, there are some small bays where the beach slopes steeply

to the sea. Some flat beach rocks are found in the splash line. The dune area is a mixture of limestone rocks and loose sand.

Land use: None.

Pollution: Tar and plastic rubbish was seen on the beach.

Turtle situation: A dead Loggerhead Turtle, *Caretta caretta*, was found on the beach. It was decayed and according to local coastal guards, it was lying here at least since two months. Its carapace length was 0.62 m.

Nesting potential: The beach would be very suitable for turtle nesting.

Fauna: Seven Greater Sand Plovers, four Kentish Plovers, a Redshank, a Green Sandpiper and a Yellow-legged Gull were recorded on the beach.

Protection: None.

Recommendation: The beach and the extensive sand dunes and limestone formations should be protected.

ID-number: 4.13. (17)

Explanation: The beach extends from 1 km west of the Kom Marzoke military post to the next military post in the west.

Co-ordinates: 31°30'N 26°27'E

Beach length: 5.0 km

Beach width: 0-5 m

Description: Mostly rocky shore. Flat beach rocks are found in the splash zone. To the rear of it, there is sometimes somewhat sand, but usually, about 2 m high rocky cliffs follow behind it.

Land use: None.

Pollution: There was an extreme pollution by tar. A several cm thick layer of crude oil frequently covered the rocks completely. Tar balls were found everywhere along the shore.

Turtle situation: -

Nesting potential: The shore is too rocky for marine turtle nesting.

Fauna: A Greater Sand Plover, two Kentish Plovers and a Green Sandpiper were present on the beach.

Protection: None.

Recommendation: The rocks should be cleaned of the crude oil.

ID-number: 4.14. (18)

Explanation: The beach is limited by military posts on both sides.

Co-ordinates: 31°31'N 26°25'E

Beach length: 8.0 km

Beach width: 15 m

Description: Like beach no. 4.13., also this beach consists mainly of rocks, but there are more sandy upward areas than in the other section. This beach also includes some sandy bays with a maximum length of 100 m. The beach there consists of fine sand and slopes gently to the sea. Sand dunes and limestone formations form the rear of the beach. Sand lilies grow in the dunes.

Land use: None.

Pollution: The beach was polluted with crude oil and with plastic litter.

Turtle situation: -

Nesting potential: The beach is unsuitable for significant marine turtle nesting.

Protection: None.

ID-number: 4.15. (19)

Explanation: The area is limited by military posts on both sides.

Co-ordinates: 31°32'N 26°19'E

Beach length: 5.0 km

Beach width: 20 m

Description: Flat beach rocks are found almost everywhere in the splash zone. To the rear, the flat rocks oftenly emerge and form steep cliffs, but are then gradually replaced by sand dunes and white limestone formations. At several places, small sandy bays (with a maximum length of 200 m) are interspersed inbetween the beach rocks. These bays consist of fine sand with some shingle intermixed. One of these sandy patches at the eastern end of the beach slopes relatively steeply to the sea, forming two steps.

Land use: None.

Pollution: The heaviest pollution by crude oil between Alexandria and El-Salum was found here. A 50 m long area of beach rocks was completely covered with a thick, black layer of tar. The pollution by plastic rubbish was modest.

Turtle situation: -

Nesting potential: The beach is too rocky for significant marine turtle nesting.

Fauna: The tracks of Foxes and of the Egyptian Mongoose, *Herpestes ichneumon*, were seen on the beach. Three Greater Sand Plovers were recorded on the beach and a Great Grey Shrike and several Crested Larks in the sand dunes.

Miscellaneous: At several places, there were aggregations of Neptune-grass (*Posidonia oceanica*) on the beach, forming wall-like structures of up to 50 m high. Cartridges of hunters found in the sand dunes may indicate that the area is used as a hunting ground in winter.

Protection: None.

Recommendation: The rocks should be cleaned from the crude oil.

ID-number: 4.16. (20)

Explanation: The beach is limited by military posts on both sides.

Co-ordinates: 31°34'N 26°09'E

Beach length: 8.0 km

Beach width: 20 m

Description: This coastal area consists mainly of flat beach rocks, but there are several sandy patches intermixed. Fine white sand is the main material here, but some shingle is intermixed. Steep up to 2-4 m high cliffs are sometimes found in the splash line, sometimes to the rear of the flat beach rocks. Sand dunes and limestone formations form the hinterland of the beach.

Land use: None.

Pollution: The beach is heavily polluted with crude oil and modestly polluted with plastic litter.

Turtle situation: One dead Loggerhead Turtle, *Caretta caretta*, was found on the beach. It was already in the state of decomposition and most soft parts had already decayed. The carapace length was 0.62 m.

Nesting potential: The beach is unsuitable for significant turtle nesting.

Fauna: The tracks of foxes and of an Egyptian Mongoose, *Herpestes ichneumon*, were seen on the beach. For the Egyptian Mongoose, this is the westernmost record in Egypt so far. 18 Greater Sand Plovers, eight Kentish Plovers and a Common Sandpiper were recorded along the shore line.

Miscellaneous: There were aggregations of Neptune-grass (*Posidonia oceanica*) at several places of the beach.

Protection: None.

ID-number: 4.17. (21)

Explanation: The beach is limited by military posts on both sides.

Co-ordinates: 31°36'N 26°05'E

Beach length: 4.0 km

Beach width: 20 m

Description: The area consists mainly of flat beach rocks (sometimes also of steep cliffs some metres high), but there are several sandy patches intermixed. Fine white sand mixed with some shingle is the beach material here. Sand dunes and limestone formations form the hinterland of the beach.

Land use: None.

Pollution: The beach was heavily polluted with crude oil. As the tar became liquid under the sun, there was a large oil lake on the flat beach rocks. The pollution by plastic rubbish was moderate.

Turtle situation: A large dead Loggerhead Turtle, *Caretta caretta*, was found washed ashore. Its carapace length was 0.73 m. As the soft parts were inflated, it seemed to have not been there a long time.

Nesting potential: The beach is too rocky for significant turtle nesting.

Fauna: Tracks of foxes were seen in the sand and two Greater Sand Plovers, six Kentish Plovers and a Redshank were recorded on the beach and a Great Grey Shrike in the dunes.

Miscellaneous: There were some aggregations of Neptune-grass (*Posidonia oceanica*).

Protection: None.

ID-number: 4.18. (22)

Explanation: The beach is limited by the settlement of Sidi Barrani in the west and the beginning of large rocks in the east.

Co-ordinates: 31°37'N 25°58'E

Beach length: 6.5 km

Beach width: 15-30 m

Description: Most of the coast is rocky, but is interspersed by many small sandy bays. In these bays, the sand is very fine-grained and large pebbles are found to the rear.

Land use: A long-line fisherman was present on the beach.

Pollution: The beach is heavily polluted with crude oil washed onto the beach from the sea. There was also a moderate pollution by plastic rubbish which included many medical instruments (one-way syringes, plastic tubes etc.). A pipe which opened to the sea apparently brought cooling water from an electrical power plant.

Turtle situation: -

Nesting potential: The beach is unsuitable for turtle nesting due to the presence of beach rocks.

Protection: None.

5 Gulf of Salum

ID-number: 5.1. (24)

Explanation: The beach is limited by rocks on both sides.

Co-ordinates: 31°37'N 25°50'E

Beach length: 0.6 km

Beach width: 20-30 m

Description: A fine sandy beach. The splash line of high water level (high tide) is located on the higher shore. Thus the wet sand covers about 50% of the beach width. The sandy shore is interrupted by flat beach rocks in some places.

Land use: None.

Pollution: The beach was polluted with oil and plastic litter.

Turtle situation: The track of a female Loggerhead Turtle, *Caretta caretta*, was found on the beach on 1 July 1993. After she had deposited her clutch at night, coastal guards found her and turned her onto the back and left her like this on the beach. In the morning, the soldiers returned to the turtle and released her.

Nesting potential: Although the beach is rather short, it is very suitable for turtle nesting.

Protection: None.

ID-number: 5.2. (25)

Explanation: The beach is limited by military posts on both sides.

Co-ordinates: 31°35'N 25°48'E

Beach length: 9.0 km

Beach width: 15 m

Description: The beach consists of fine sand. Only at a few places, limestone rocks and flat beach rocks are found. During high water level, the splash zone extends over the whole beach. At the rear of the beach, extensive sand dunes and limestone formations are found.

Land use: None.

Pollution: The beach is polluted with crude oil and plastic rubbish to some degree.

Turtle situation: The track of a female Loggerhead Turtle, *Caretta caretta*, was found on 1 July 1993. She made two apparently unsuccessful attempts to deposit her clutch. The attempts of clutch deposition were made within the splash zone of high water level (high tide).

Nesting potential: The beach would be very suitable for significant marine turtle nesting.

Fauna: The tracks of a fox were seen on the beach.

Protection: None.

Recommendation: The beach should be protected because of the extensive sand dunes to the rear of the beach.

ID-number: 5.3. (23)

Explanation: The beach is limited by a military post in the east and by a rocky shore in the west.

Co-ordinates: 31°31'N 25°39'E

Beach length: 5.5 km

Beach width: 30 (- 60) m

Description: A sandy beach with a mean width of 30 m. The width increases up to 60 m at some places. The slope to the sea is gentle. The beach material is a white, fine sand. Extensive white primary sand dunes are found at the rear of the beach.

Land use: None. The tracks of two dogs were seen on the beach.

Pollution: The beach was polluted with crude oil washed ashore and with a lot of plastic rubbish.

Turtle situation: -

Nesting potential: The beach is very suitable for marine turtle nesting.

Fauna: A Kentish Plover, two Common Terns and two Yellow-legged Gulls were noted along the shore.

Miscellaneous: There was much Neptune-grass (*Posidonia oceanica*) on the beach, in particular in the splash zone where it formed a wall at some places. The wrecks of two ships from the Second World War emerge from the sea in front of the coastline.

Protection: None.

Recommendation: The area should be protected because of its extensive primary sand dunes.

ID-number: 5.4. (29)

Explanation: The beach extends between two military posts in the east and west.

Co-ordinates: 31°31'N 25°29'E

Beach length: 5.0 km

Beach width: 35 m

Description: A wide beach consisting of fine, loose sand. About 30 m high sand dunes and limestone formations rise at the rear of the beach.

Land use: None.

Pollution: The beach was slightly polluted with crude oil and plastic rubbish.

Turtle situation: The carapace of a Loggerhead Turtle, *Caretta caretta*, was found on the beach. The soft parts had already decayed. The length of the carapace was 0.72 m.

Nesting potential: The beach would be well-suited to marine turtle nesting.

Protection: None.

Recommendation: The beach and the sand dunes and limestone formations should be protected.

ID-number: 5.5. (30)

Explanation: The limits of the beach are military posts on both sides.

Co-ordinates: 31°30'N 25°26'E

Beach length: 4.5 km

Beach width: 5-7 m

Description: On about half of the beach length, the beach is covered by flat beach rocks. Above the beach rocks, there is an usually 5-7 m broad sandy strip. At the rear of it, sand dunes and limestone formations begin immediately. There is a sparse vegetation cover of the dune area.

Land use: None.

Pollution: Modest pollution by tar balls and plastic litter.

Turtle situation: -

Nesting potential: The area would be very suitable for marine turtle nesting.

Fauna: Eleven Greater Sand Plovers were recorded.

Miscellaneous: There were large aggregations of Neptune-grass (*Posidonia oceanica*) along the shore. They formed often a wall-like structure.

Protection: None.

Recommendation: The beach and the dune area should be protected.

ID-number: 5.6. (31)

Explanation: The limits of the beach are military posts on both sides.

Co-ordinates: 31°30'N 25°22'E

Beach length: 8.0 km

Beach width: 30 m

Description: Next to the sea, there is an about 15 m wide strip of wet sand, behind which the beach slopes modestly and the sand becomes drier accordingly. Sand dunes and limestone formations are situated at the rear of the beach.

Land use: None.

Pollution: The coast was polluted with tar balls and plastic litter.

Turtle situation: -**Nesting potential:** The beach would be very suitable for marine turtle nesting.**Protection:** None.**Recommendation:** The beach and the sand dunes and limestone formations should be protected.**ID-number:** 5.7. (28)**Explanation:** The western limit of the beach is a radar station, the eastern limit a military post.**Co-ordinates:** 31°30'N 25°18'E**Beach length:** 3.0 km**Beach width:** 10-30 m**Description:** There are beach rocks almost all along the coast length, but sandy places are found inbetween them. They are always less than 200 m long. Some large pebbles are intermixed among the fine sand. White sand dunes and limestone formations are found to the rear of the beach.**Land use:** None. Some donkeys' and dogs' tracks were seen in the sand.**Pollution:** The flat beach rocks were considerably polluted with a layer of crude oil and plastic litter.**Turtle situation:** -**Nesting potential:** The beach is less suitable for turtle nesting as the splash line mostly consists of beach rocks.**Fauna:** Five Kentish Plovers, 17 Common Sandpipers, nine Green Sandpipers and about 40 Redshanks were seen along the beach.**Protection:** None.**ID-number:** 5.8. (27)**Explanation:** The western limit of the beach is the beginning of fine sand near a military camp, the eastern limit a radar station.**Co-ordinates:** 31°31'N 25°14'E**Beach length:** 4.0 km**Beach width:** 10-30 m**Description:** The beach consists of loose sand which is fine to medium grained. Many mussel shells are mixed with the sand. The area at the rear of the beach is extremely flat in the west (covered with scrub vegetation), but there are somewhat hilly dunes and limestone formations in the east. This beach forms the transition area from the oolitic limestone formations and sands between Alexandria and El-Salum to the shingle and quartz sands around El-Salum.**Land use:** None. Tracks of dogs were seen in the sand.**Pollution:** The pollution of the beach with crude oil and plastic rubbish was moderate.**Turtle situation:** -**Nesting potential:** The beach would be very suitable for turtle nesting.**Protection:** None.**Recommendation:** The area should be protected because its unspoilt beach and hinterland.**ID-number:** 5.9. (26a)**Explanation:** The beach extends from the Navy base of El-Salum in the west to the Military camp in the east.**Co-ordinates:** 31°32'N 25°11'E**Beach length:** 6.0 km**Beach width:** 6-30 m**Description:** The beach consists of coarse-grained sand with intermixed shingle in particular to the west. Sand dunes are completely absent. In the west, within El-Salum, areas with shingle form the hinterland of the beach. More to the east, fine shingle and flat sand beds covered with dwarf scrub are situated at the rear of the beach.

Land use: The eastern part of the beach belongs to El-Salum and houses extend onto the beach. In the east, there were a few people swimming and long-line fishing.

Pollution: The beach was polluted with tar and plastic litter.

Turtle situation: -

Nesting potential: The beach is too stoney and too much under the influence of the public life of El-Salum to provide suitable nesting habitats for marine turtles.

Protection: None.

ID-number: 5.10. (26b)

Explanation: Some very small bays at the foot of high cliffs.

Co-ordinates: 31°35'N 25°10'E

Beach length: 0.5 km (total length)

Beach width: 1-5 m

Description: A few very small sandy strip at the foot of high cliffs and rocky mountains.

Land use: None.

Pollution: None recorded.

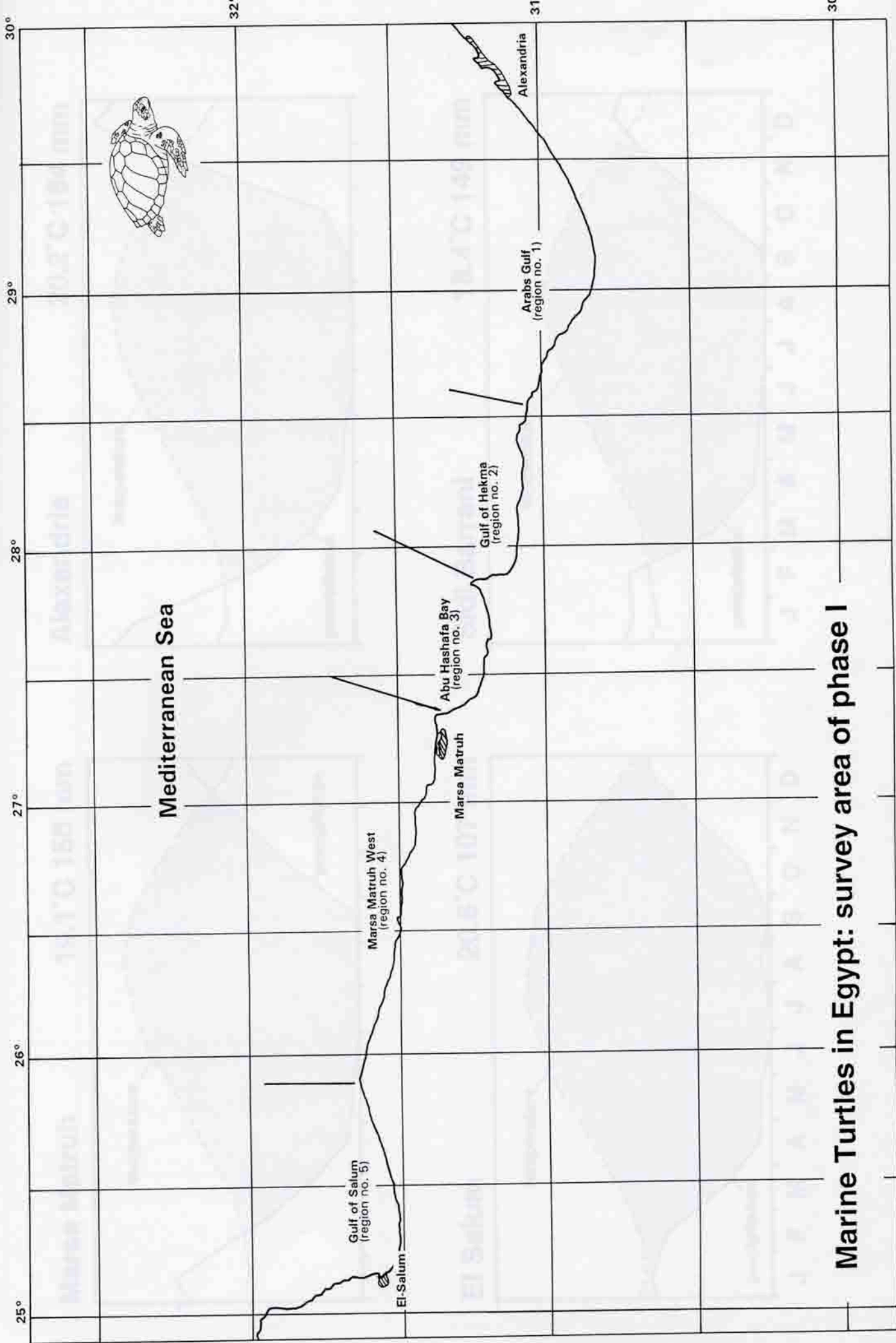
Turtle situation: -

Nesting potential: The area is too small and there is too much shingle for turtle nesting.

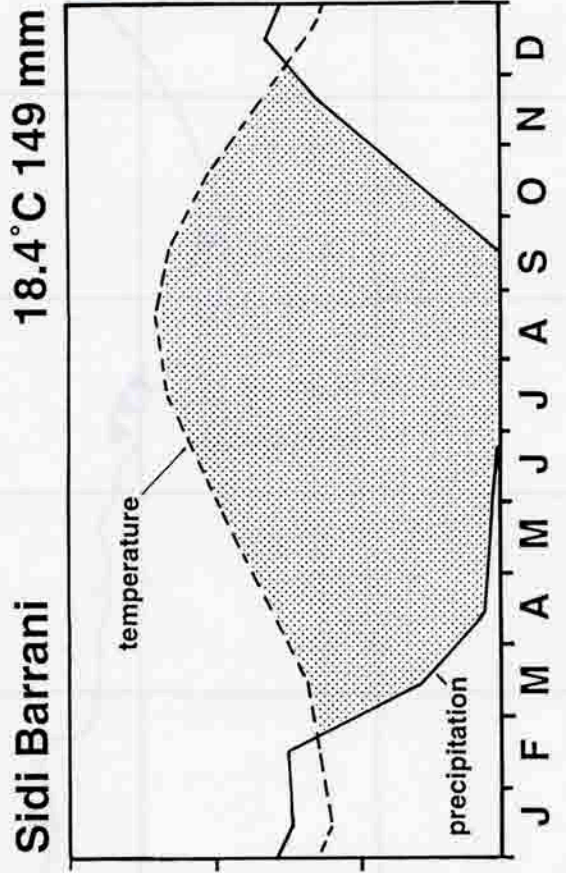
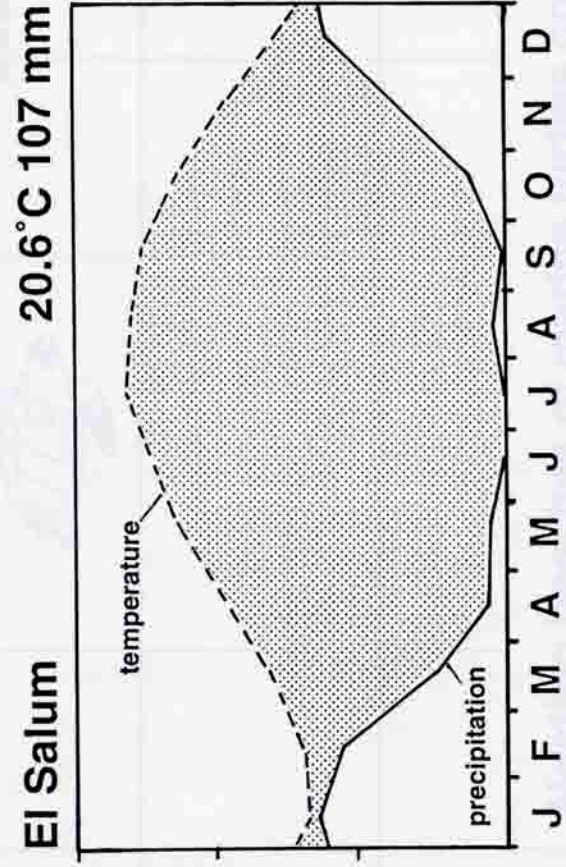
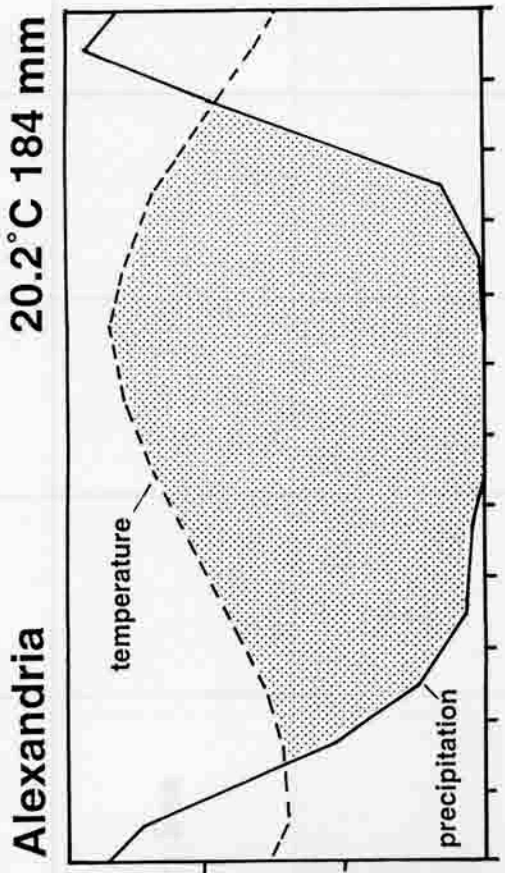
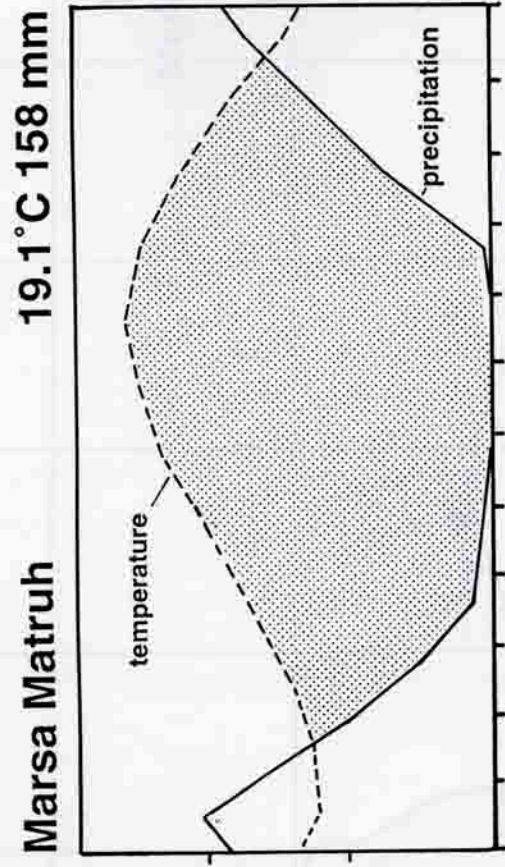
Fauna: A Kestrel was hunting over the area.

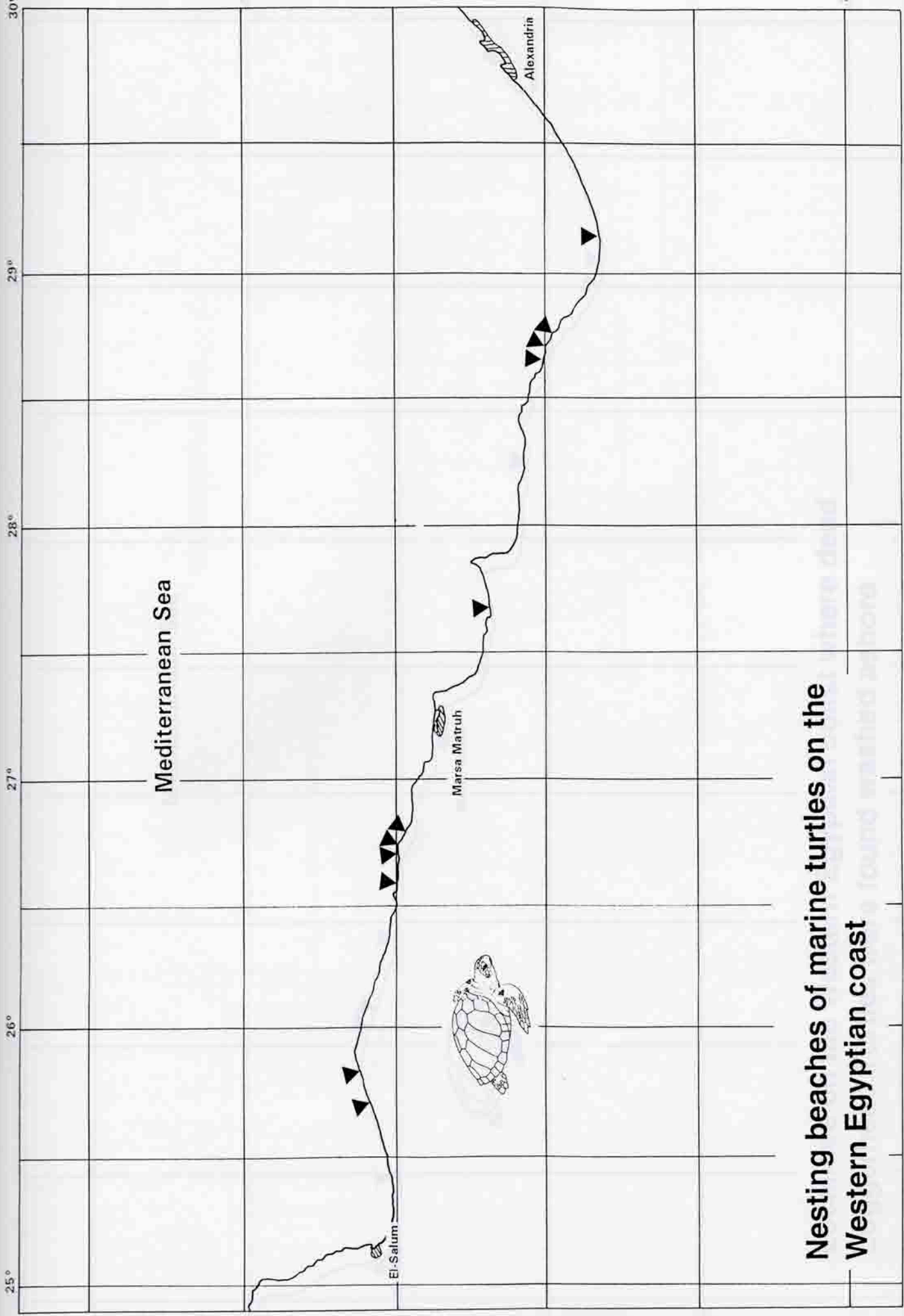
Miscellaneous: The area may be used by the navy. Access was only gained by passing through the navy camp.

Protection: None.

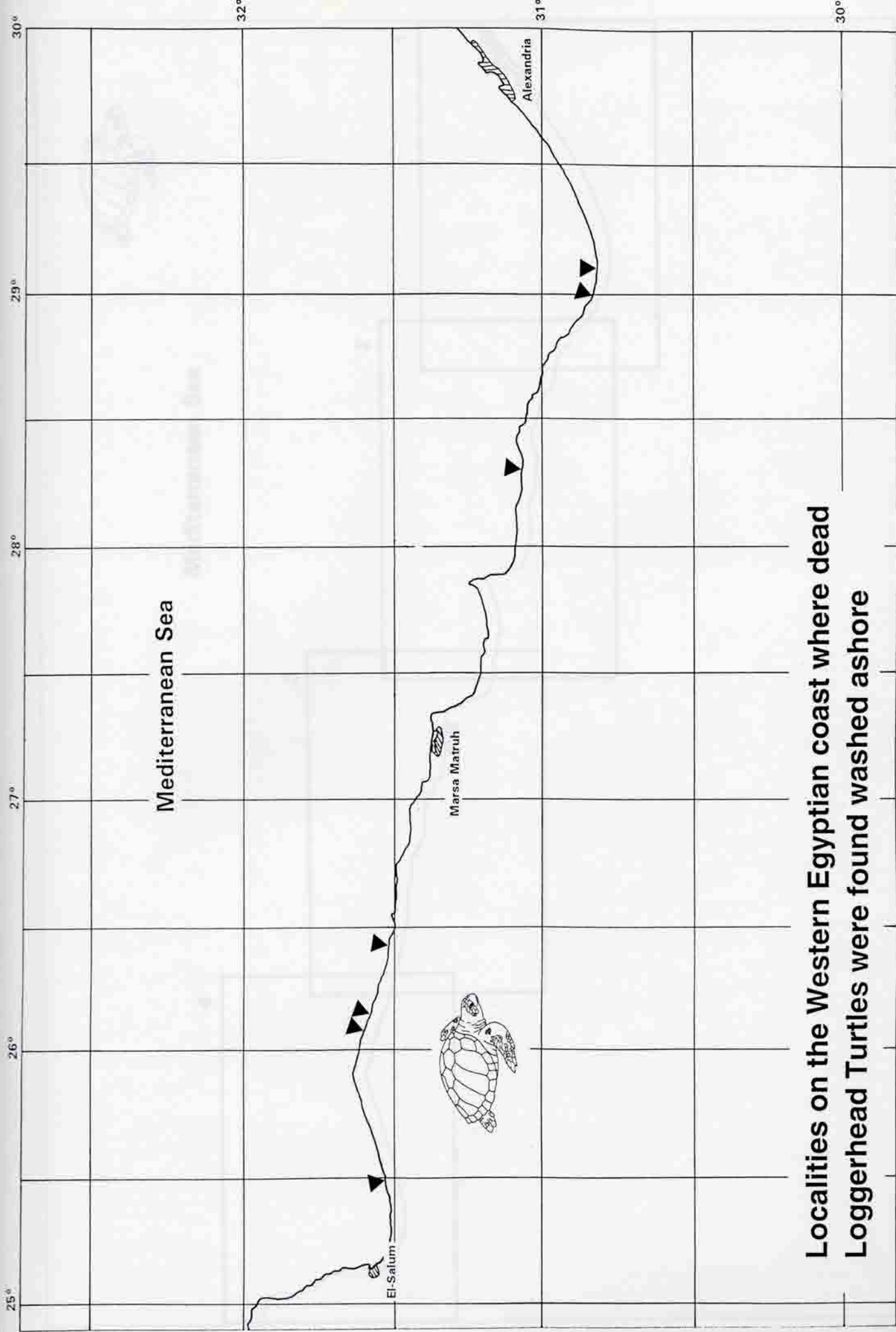


Marine Turtles in Egypt: survey area of phase I





Nesting beaches of marine turtles on the Western Egyptian coast



**Localities on the Western Egyptian coast where dead
Loggerhead Turtles were found washed ashore**



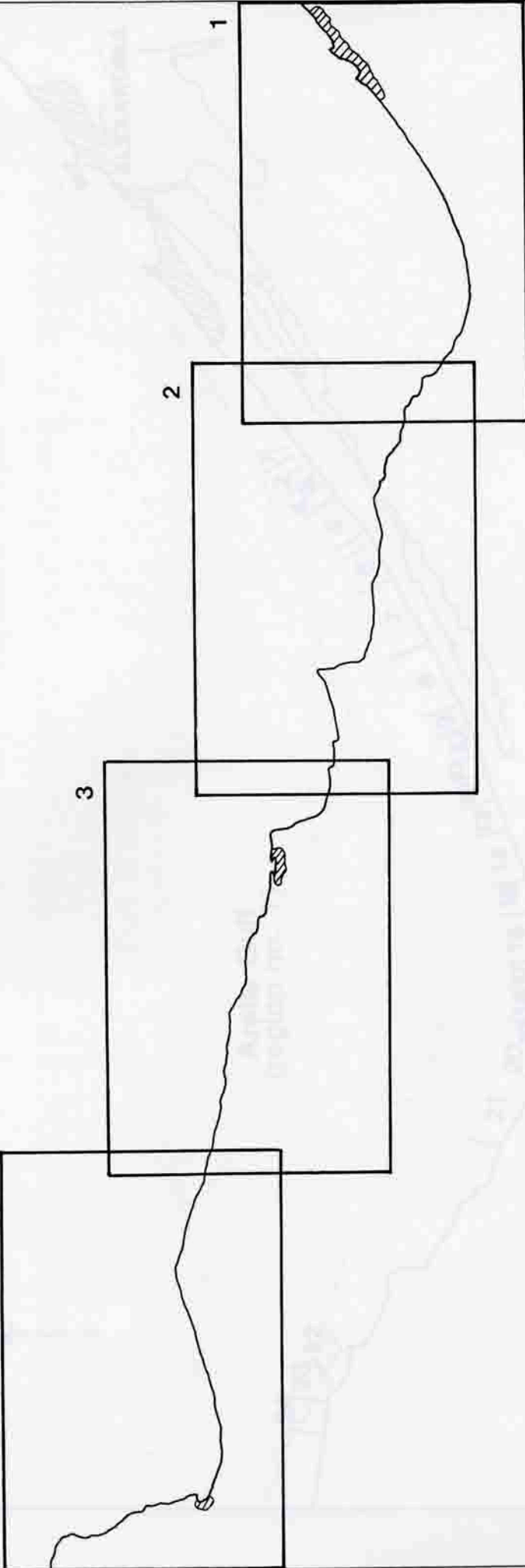
Mediterranean Sea

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3

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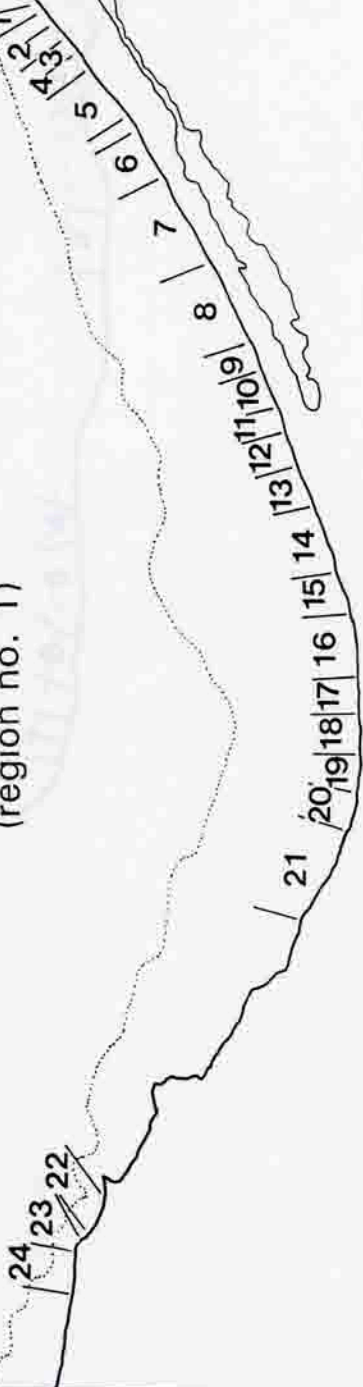
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ALEXANDRIA

Arabs Gulf
(region no. 1)





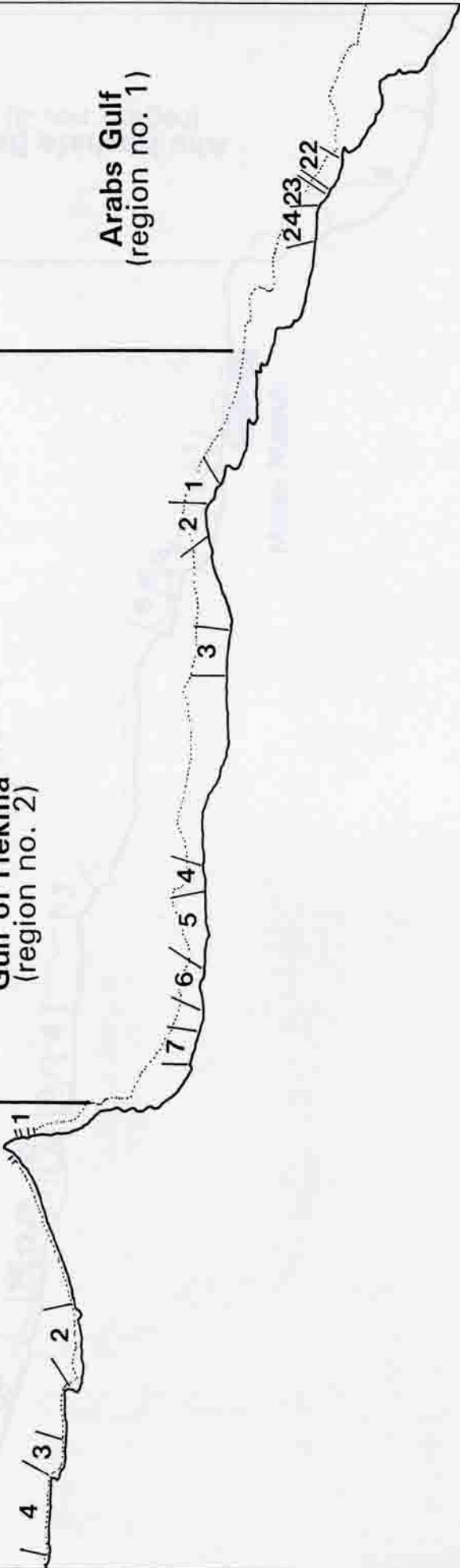
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Abu Hashafa Bay
(region no. 3)

Gulf of Hekma
(region no. 2)

Arabs Gulf
(region no. 1)

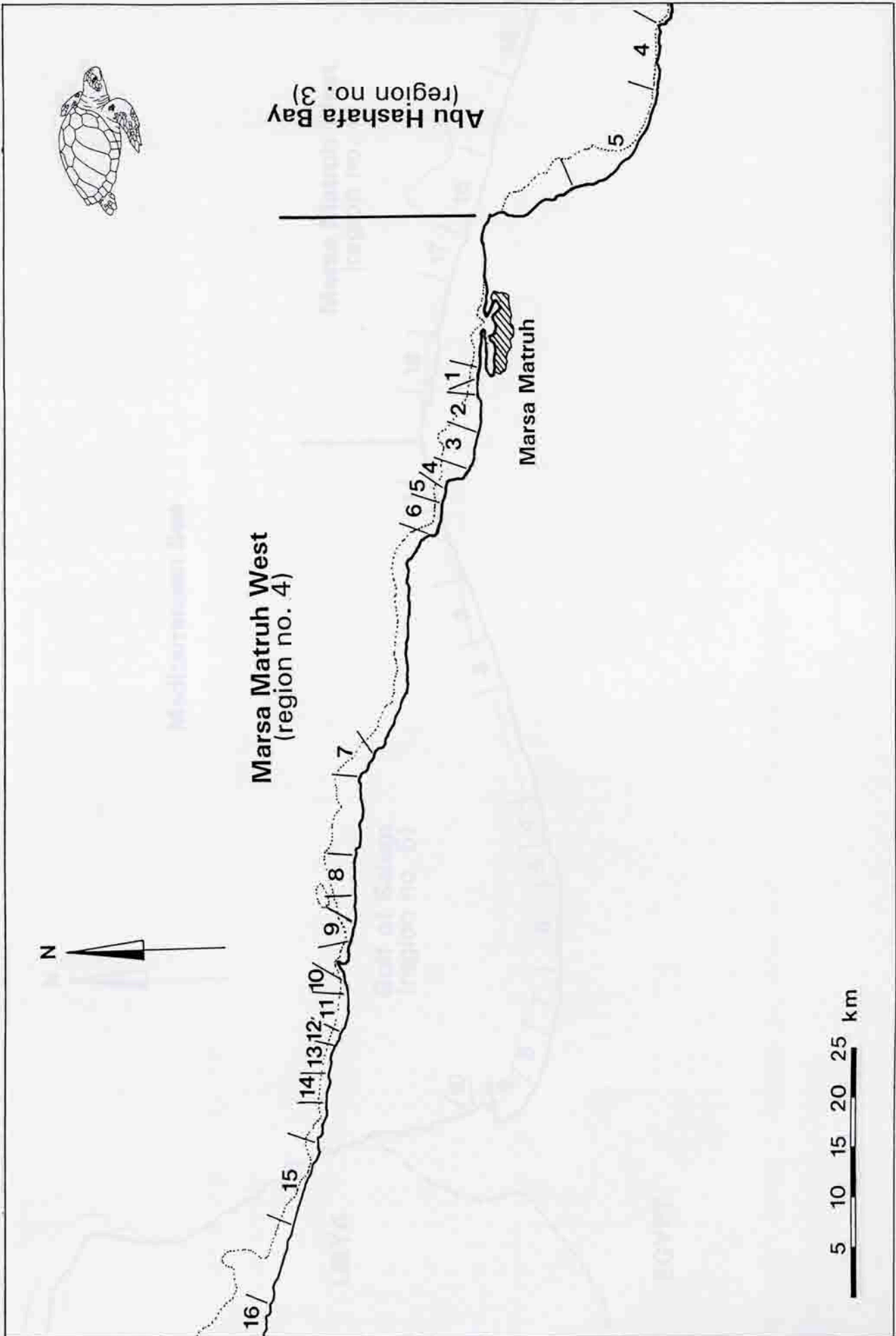




Abu Hashafa Bay
(region no. 3)

Marsa Matruh West
(region no. 4)

Marsa Matruh





Mediterranean Sea

Marsa Matruh West
(region no. 4)

Gulf of Salum
(region no. 5)



LIBYA

EGYPT

