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**MEDITERRANEAN ACTION PLAN**

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**Guidelines for the Management and Monitoring Threatened  
Population of Marine and Coastal Bird Species and  
their Important Areas in the Mediterranean.**



## Introduction

In 2003 the Regional Activity Centre for Specially protected Areas (RACSPA) published an Action Plan for the conservation of bird species listed in Annex II of the protocol SPA and biological diversity. This action plan forms a logical base for decision-making at the regional level and provides a setting for detailed planning and implementation at the national level. Its main objective is to maintain and/or restore the population levels of bird species found in the SPA Protocol's Annex II to a favourable conservation status, to stop the decline of any species and to increase the populations to acceptable levels to ensure their long-term conservation. The bird species, which figure in Annex II, are listed in the following Table (Table1). This gives a brief overview of their current status in the Mediterranean.

**Table 1: Overview of the current status of bird species listed in Annex II of the SPA /BD Protocol**

Annex II species	Current Status
<p><b>Cory's Shearwater</b> <i>Calonectris diomedea</i></p>	<p>Nominate race <i>Calonectris d. diomedea</i> is restricted to the Mediterranean. Breeds in sea-cliffs, and on rocky islands and islets. Population estimated at less than 76,000 pairs, but surveys in the eastern part of the Mediterranean and in the Adriatic are lacking.</p>
<p><b>Yelkouan Shearwater</b> <i>Puffinus yelkouan</i> (<i>P. Yelkouan</i> was considered as polytypic with <i>P. y. mauretanicus</i> as a subspecies. Recently it has been split into two monotypic species <i>P. yelkouan</i> and <i>P. mauretanicus</i>).</p>	<p>Restricted to the Tyrrhenian, Adriatic and Aegean Seas. Breeds on rocky islands and islets. Population 13,000 – 33,000 pairs. Some pairs may breed along the North African coast. Surveys in the eastern part of the Mediterranean and in the Adriatic are lacking.</p>
<p><b>Balearic Shearwater</b> <i>Puffinus mauretanicus</i> (<i>P. yelkouan</i> and <i>P. mauretanicus</i> are listed as one species in Annex II)</p>	<p>Endemic to the Balearic Islands. Population ca. 3,300 pairs. Breeds on rocky islands and islets.</p>
<p><b>European Storm Petrel</b> <i>Hydrobates pelagicus</i> (Mediterranean race – <i>melitensis</i>)</p>	<p>Pelagic species breeding in small to very large colonies mainly on islets and in caves along the coast. Subspecies <i>melitensis</i> is endemic to the Mediterranean. Important breeding colonies are found in Malta, Sardinia and Sicily. Breeding surveys are totally lacking for the Adriatic and eastern Mediterranean. Population in the surveyed colonies estimated at less than 16,000 pairs.</p>
<p><b>Shag</b> <i>Phalacrocorax aristotelis</i> (Mediterranean – <i>desmarestii</i>)</p>	<p>Subspecies <i>desmarestii</i> endemic to western Mediterranean (Balearic Islands, Corsica and Sardinia), and the Adriatic, Aegean and Black Seas, breeding along the coast on rocky islands and islets. Mediterranean population less than 10,000 pairs.</p>

<p><b>Pygmy Cormorant</b> <i>Phalacrocorax pygmeus</i></p>	<p>Main Mediterranean breeding populations in Serbia Montenegro (2,400 - 2,800 pairs), Greece (1,250 - 1,310 pairs), and Turkey (1,300 – 1,800 pairs), with some pairs in Albania, Israel and Italy (up to 150 pairs). Restricted to lowland freshwater and brackish habitats. In winter frequents coastal lagoons, deltas, rivers and riparian forests.</p>
<p><b>White Pelican</b> <i>Pelecanus onocrotalus</i></p>	<p>Mediterranean populations breed in Turkey (180-420 pairs) and Greece (50-100 pairs). Nests on the ground in large reed beds, bare earth or rocky islands, in isolation from mainland.</p>
<p><b>Dalmatian Pelican</b> <i>Pelecanus crispus</i></p>	<p>Mediterranean populations breed mainly in Albania (19 pairs), Greece (500-550 pairs) and Turkey (220-250). Breeds on inland and coastal wetlands. Nests on floating islands of reeds and on bare ground on islands, isolated from mainland. Up to about 3,500 birds may winter in Albania, Greece, Syria and Turkey.</p>
<p><b>Greater Flamingo</b> <i>Phoenicopterus roseus</i> (This is listed as <i>Phoenicopterus ruber</i> in Annex II. The Greater Flamingo was formerly regarded as a subspecies <i>Phoenicopterus ruber roseus</i> but recently it is being treated as a separate species <i>P. roseus</i>.)</p>	<p>Mediterranean populations breed in localised sites in suitable wetlands, mainly in Spain (23,000 pairs), France (15,300 pairs) and Turkey (15,000 – 16,000 pairs), as well as in Tunisia and Italy. Breeding is irregular with numbers fluctuating from one season to another. Substantial numbers also occur in winter in Greece (5,8000 – 11,2000 birds) and Cyprus (5,000 – 15,000 birds – in some years 4-40 pairs are known to breed). Mediterranean population seems to be separated from Asiatic populations, with minimal exchange and overlap in Libya and Egypt.</p>
<p><b>Osprey</b> <i>Pandion haliaetus</i></p>	<p>A cosmopolitan species, which is vulnerable in several regions. in the last fifteen years less than 70 pairs have been known to breed regularly in the Mediterranean (Balearic Islands, Corsica, Morocco and Algeria). Some local small populations have disappeared from other islands (e.g. Ibiza, Sicily &amp; Sardinia).</p>
<p><b>Eleonora's Falcon</b> <i>Falco eleonora</i></p>	<p>Breeds in colonies along the coast of the mainland or on rocky islands, which are often uninhabited. The total world population is about 6200 pairs. Almost all the entire population breeds on rocky Mediterranean islands. The Aegean islands and Crete hold about 70% of the whole population, but other substantial colonies are also found in Spain and Italy.</p>
<p><b>Slender-billed Curlew</b> <i>Numenius tenuirostris</i></p>	<p>Once common in the Mediterranean region, now extremely rare in the Western Palearctic. Migrates from Siberia across eastern and southern Europe to winter in North Africa. On passage, occurs in a wide range of habitats:</p>

	salt marshes, saltpans, brackish lagoons, dry fishponds, steppe and freshwater marshes.
<b>Audouin's Gull</b> <i>Larus audouinii</i>	Endemic to the Mediterranean, breeding in coastal areas and on islands (population 18,000-19,000 pairs). Main breeding populations occur in Spain (17,000).
<b>Little Tern</b> <i>Sternula albifrons</i> (listed as <i>Sterna albifrons</i> in Annex II)	Mediterranean population (may reach 20,000 pairs) mainly along southern coastline and western basin. Quantitative data from the eastern Adriatic and eastern Mediterranean countries are lacking. Breeds in rivers and deltas, estuaries, lagoons and salinas.
<b>Sandwich Tern</b> <i>Sterna sandvicensis</i>	Mediterranean population of up to 10,000 pairs. Nests in colonies mainly in river deltas and estuaries, on sandbanks and in salinas. Also migrates from elsewhere into the Mediterranean for wintering.
<b>Lesser-crested Tern</b> <i>Sterna bengalensis</i>	Small localised population of endemic subspecies <i>Sterna bengalensis emigrata</i> (less than 4,000 pairs) breeds on two Libyan offshore islands. Breeding occasionally in France, Greece, Italy and Spain

The Action Plan highlights the threats faced by these bird species, mainly oil pollution, depletion of food resources, non-sustainable forms of tourism, disturbance, direct persecution and hunting, loss and degradation of habitat, particularly wetlands, and introduction of alien species. The following Table (Table 2) gives a summary overview of current threats.

**Table 2: Summary overview of threats to annex II bird species**

<b>Annex II Species</b>	<b>Recognised Threats</b>
<b>Cory's Shearwater</b> <i>Calonectris diomedea</i>	Introduced mammals, (e.g. <i>Rattus</i> sp., which affect breeding success; illegal hunting; taking of eggs and chicks; mortality from bycatch; development close to colonies and disturbance, and possibly oil spills and chemical pollution of the sea.
<b>Yelkouan Shearwater</b> <i>Puffinus yelkouan</i>	Lack of food resources; lack of protection of breeding colonies; predation by <i>Rattus</i> sp, Yellow-legged Gulls <i>Larus michahellis</i> , and possibly feral cats; disturbance; collection for food (at least until 1970s); some mortality from bycatch; and possibly oil spills and chemical pollution of the sea.
<b>Balearic Shearwater</b> <i>Puffinus mauretanicus</i>	Lack of food resources; predation by introduced mammals; some mortality from bycatch; possibly pollution.
<b>European (Mediterranean) Storm-petrel</b> <i>Hydrobates pelagicus melitensis</i>	Loss of habitat; disturbance; predation by <i>Rattus</i> sp. and Yellow-legged Gull <i>Larus michahellis</i> ; possibly oil spills and chemical pollution of the sea.

<p><b>Shag</b> <i>Phalacrocorax aristotelis desmarestii</i></p>	Human disturbance; oil pollution; habitat loss; mortality from bycatch; Seine net fishing and long-line hauling close to colonies and moulting areas.
<p><b>Pygmy Cormorant</b> <i>Phalacrocorax pygmeus</i></p>	Degradation and loss of wetland habitat; persecution by fishermen; disturbance and hunting; destruction of breeding colonies.
<p><b>White Pelican</b> <i>Pelecanus onocrotalus</i></p>	Habitat loss and destruction; depletion of fish stocks; persecution and disturbance; pollution, flooding; disease; collision with electric power-lines.
<p><b>Dalmatian Pelican</b> <i>Pelecanus crispus</i></p>	Wetland drainage resulting in a sharp decline of available breeding sites; hunting; collisions with electric wires; persecution due to competition with commercial fisheries; and also some contamination by pesticides and heavy metal residues.
<p><b>Greater Flamingo</b> <i>Phoenicopterus roseus</i></p>	Urban development; habitat loss for tourism development; disturbance; hunting.
<p><b>Osprey</b> <i>Pandion haliaetus</i></p>	Habitat destruction and disturbance at breeding sites related to tourism. Some mortality also from illegal poaching and electrocution also occur.
<p><b>Eleonora's Falcon</b> <i>Falco eleonorae</i></p>	Predation by cats and rats; human disturbance in colonies; habitat degradation; taking of eggs and young; hunting.
<p><b>Slender-billed Curlew</b> <i>Numenius tenuirostris</i></p>	Habitat loss in passage and wintering areas. Other factors unknown.
<p><b>Audouin's Gull</b> <i>Larus audouinii</i></p>	Habitat alterations at breeding sites; changes in fishing practices and competition mainly with the Yellow-legged Gull <i>Larus michahellis</i> ; egg collection and human persecution and disturbance. The depletion of food resources and chemical pollution and spills as threats and limiting factors are not properly known.
<p><b>Little Tern</b> <i>Sternula albifrons</i></p>	Habitat loss; disturbance; predation; colony destruction.
<p><b>Sandwich Tern</b> <i>Sterna sandvicensis</i></p>	Coastal development; disturbance by humans and animals; predation.
<p><b>Lesser-crested Tern</b> <i>Sterna bengalensis</i></p>	Occasional disturbance by fishermen; probably predation by Yellow-legged Gull <i>Larus michahellis</i> ; and possibly oil pollution and toxic chemicals.

The Action Plan also underlines the fact that there are still many gaps in our knowledge concerning coastal and pelagic birds and their habitats in the Mediterranean, particularly seabird movements and their distribution at sea. Very little mapping, if any, of breeding, feeding, moulting and wintering areas of pelagic birds in the Mediterranean have been carried out. Due to this gap in our knowledge any project to manage their marine and coastal sites as well as to monitor their populations will be somewhat handicapped from its onset.

The monitoring and management of protected areas of coastal and marine important bird areas are indispensable in ensuring the long-term conservation of these bird species. One of the main actions to achieve the objectives of the Action Plan is the elaboration of a set of guidelines for monitoring the populations of these species and for the development of management plans for the coastal areas where they breed.

The objectives of this document are therefore the elaboration of such guidelines. Monitoring is generally one of the main activities envisaged in a management plan of an area and thus the guidelines are being presented hereunder in two sets in the following order:

- a)** Guidelines for management plan for coastal and marine important areas to birds (nesting, moulting, breeding, feeding, wintering) and/or marine and coastal protected areas; and
- b)** Guidelines for monitoring threatened population of marine and coastal bird species in the Mediterranean.

## **GUIDELINES FOR MANAGEMENT PLAN FOR COASTAL AND MARINE IMPORTANT AREAS TO BIRDS AND/OR MARINE AND COASTAL PROTECTED AREAS**

### **Introduction**

A management plan is the means by which a set of defined goals and objectives are reached. It may, or may not be a legal document but it must be capable of being understood by those whose duty is to implement it, and by those whose actions it seeks to control. Management plans may differ depending on the goals and objectives. A management plan could be a small-scale site-specific one. It could simply be aimed at eradicating an alien species from a particular area. Or it could be a large scale integrated one aimed at an entire ecosystem. It could address various problems and threats threatening the whole ecology of a site, or the population of one or more vulnerable species. It could include the restoration of a degraded site into its former ecological importance.

The first step in any management planning process is to define the goals and objectives of a management plan; in this case a management plan for a coastal and marine area that supports a colony, or colonies, of breeding birds. (All the species in Annex II are colonial nesters except for *Pandion haliaeetus* and *Numenius tenuirostris*, the latter being a very rare winter visitor). Ideally a small group of people should be in charge of the process. They should form a steering committee and identify a project coordinator. The planning process should include public awareness and participation on its agenda, as well as the use of the media.

In the early stages there are some basic questions, which need to be answered:

- a) What are the main issues that need to be addressed?
- b) What is the geographic range that the plan will cover?
- c) What existing information is available?
- d) What are the gaps in the information required?
- e) Are there enough resources (human and financial) to produce the plan? (Is hiring a consultant a necessity?)
- f) How is the consultation process going to be organised?
- g) What are the important commitments that should be obtained from the official side?

In the early stages of planning and management one should not be discouraged if there is a lack of sophisticated data. A realistic, competent plan can be developed on the basis of very simple descriptions of the physical, biological and socio-economic characters of an area. Each management plan may have to address problems, which are not encountered in other plans. But management plans generally have a similar format even if they have to address different problems.

A management plan should:

- a) introduce and define its purpose and scope with a clear statement of the goals and objectives;
- b) define the area, giving a geographic description of its setting and accessibility;
- c) focus on the resources found in the area; in this case the birds listed in Annex II;
- d) include and describe other resources found in the area;
- e) identify, describe and present, within a historical and legal context, any uses of the area, whether social or economical;
- f) highlight threats and conflicts;
- g) declare how the plan will deal with all the known threats to achieve its objectives;
- h) describe monitoring, research, surveillance, enforcement, interpretation and education, and restoration programmes.

All the above actions necessitate an orderly and efficient administration. The administration may have to face and solve several constraints, has to ensure adequate monitoring as well as an

evaluation of the plan's implementation. It has to apply the plan in a flexible manner to adapt it to deal with changed circumstances in a way, which would improve the management of the site, and review the plan after a pre-determined period of years (usually four to five years).

The following Table (Table 3) is an example of a management plan, which can be applied for any area supporting the species found in Annex II and for which these guidelines are earmarked.

**Table 3: Example of Management Plan Format**

<b>Format &amp; Contents</b>	<b>Notes</b>
<b>TITLE PAGE</b>	<p>This should include:</p> <ul style="list-style-type: none"> <li>• the name of the site to be managed and its status;</li> <li>• the words - MANAGEMENT PLAN;</li> <li>• the name of the institution, organisation or any other agency responsible for implementing the plan;</li> <li>• the preparation date of the plan; and</li> <li>• the expected date for the management plan's review.</li> </ul>
<b>EXECUTIVE SUMMARY</b>	<p>This should cover the fundamental issues and necessary decisions. Decision makers do not always have time to go through all the details of a management plan and such a summary is therefore essential to have immediately after the title page. The summary should include briefly:</p> <ul style="list-style-type: none"> <li>• the reasons underpinning the plan;</li> <li>• its timeframe;</li> <li>• any special preparatory conditions (including the legislative basis and authority for plan development);</li> <li>• the main items of the plan;</li> <li>• an estimated budget; and</li> </ul>
<b>CONTENTS PAGE</b>	<p>This should list all the headings of the plan against the appropriate page numbers. Sub-headings should also be included to make it user-friendlier.</p>
<b>OBJECTIVES FOR MANAGEMENT</b>	<p>The goals and objectives for management are stated in this section. They should reflect the rationale underpinning the protection and management of the area.</p>
<b>RESOURCE DESCRIPTION</b>	<p>This section should provide information on the following topics:</p> <ul style="list-style-type: none"> <li>• Name of area, exact location and size;</li> <li>• Define the physical features of the site regarding the ecology of the species (eg. Climate (precipitation, temperature, and winds), Geographic and habitat classification; Geology; Hydrology, etc).</li> <li>• Plant life. This should include at least a description of the dominant plant communities. A species list of plants identified in the area should be listed in an appendix.</li> <li>• Fauna (other than birds) – a brief overview of species having interaction with the bird species concerned.</li> <li>• Conservation status at different levels.</li> <li>• Nature of threats (concerning both species and site); <ul style="list-style-type: none"> <li>○ History with a summary account of any human involvement in the area;</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Current human use and development;</li> <li>○ Risk of pollution; Etc.</li> <li>• Avifauna – a detailed overview of the bird life of the area (for the purpose of this document we have to assume that the main module are the birds which are listed in Annex II of the protocol concerning specially protected areas and biological diversity in the Mediterranean. See Table 1.) One may here emphasise the requirements of the species which is addressed by the management plan as well as the interactions with other species.</li> </ul>
<b>DESCRIPTION OF MANAGEMENT ISSUES</b>	A detailed overview of threats (see Table 2) and possible management conflicts should be presented in this section. One should also include some information on any historic or current conflicts between uses or user groups.
<b>MANAGEMENT POLICIES</b>	<p>This section should</p> <ul style="list-style-type: none"> <li>a) address the threats and conflicts and recommends solutions while reiterating clearly the goals and objectives.</li> <li>b) describe any programme of surveillance (e.g. assessing movement of people or any vessels and aircraft within or close to the area).</li> <li>c) describe a monitoring and research programme particularly of the species for which the area is being managed (see “Guidelines for monitoring threatened population of marine and coastal bird species in the Mediterranean” in this document). A detailed and time-framed monitoring programme could also be presented as an appendix.</li> <li>d) set timeframes for programmes and how these will be used to review the management plan.</li> <li>e) describe cooperation programs with educational institutions, associations and community groups to promote protection, public understanding, and wise use.</li> <li>f) outline any necessary enforcement arrangements to detect apparent offences and to apprehend and prosecute offenders (but it must be emphasised that education should be the main management tool to eliminate offences).</li> </ul>
<b>MAINTENANCE ADMINISTRATION.</b> &	<p>This section should present</p> <ul style="list-style-type: none"> <li>a) the budget (anticipating costs to seek the necessary funds).</li> <li>b) staffing needs (including consultants and volunteers).</li> </ul>
<b>INFORMATION SOURCES</b>	A list of government agencies, non-government organisations, individuals, consultants, etc. who provided Information regarding the area used in the management plan.
<b>REFERENCES</b>	This should include a list of publications and reports used to compile the management plan.

<b>APPENDICES</b>	<p>These may include:</p> <ul style="list-style-type: none"><li>• flora list;</li><li>• fauna list;</li><li>• maps;</li><li>• photographs;</li><li>• figures;</li><li>• tables;</li><li>• time-framed monitoring programmes.</li></ul>
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## **GUIDELINES FOR MONITORING THREATENED POPULATION OF MARINE AND COASTAL BIRD SPECIES IN THE MEDITERRANEAN**

Natural resource monitoring is the collection and analysis of repeated observations or measurements to evaluate changes in condition and progress towards meeting a management objective. The regular monitoring of selected species can identify changes, if any, in population numbers, but it can also perceive changes in the threats or detect any possible new threats. Reliable information on changes in population levels and on the causes of those changes is therefore vital and presents the timely opportunity to apply the necessary management activities to overturn or prevent negative trends.

These guidelines are aimed at the fifteen (now considered to be sixteen) species listed in Annex II of the protocol SPA and biological diversity, and may be applied to them accordingly. Except for the Slender-billed Curlew *Numenius tenuirostris*, all the species breed in the Mediterranean, and all of them, with the exception of *Pandion haliaeetus*, breed in colonies.

The size of a population can be effectively used as a tool to measure the well being of a species and therefore it is imperative to monitor the population of threatened marine and coastal bird species in the Mediterranean. In those areas where some form of "stock-taking" has already been undertaken, this can be used as a benchmark for a monitoring programme, which in a period of a few years will help to identify any positive or negative trend of a population, assuming that the same methods to collect data are used (An example of Annual colony register is given in annex I).

In any "stock-taking" exercise, particularly in the poorly known bird areas, one has to start by answering simple questions:

Do any of the Annex II species occur here?

- When do they occur?
- In what numbers do they occur?

It is surprising the amount of important information that can be gathered by answering such simple questions. Colonies of breeding birds, which can be fairly easy to locate and count (such as gulls and terns), do not pose much of a problem to monitor. But species, such as shearwaters and petrels, which breed on remote and inaccessible areas, present a different story. It is understandable that with a number of the species found in Annex II, such as *Hydrobates pelagicus* and *Puffinus* sp, even their detection may be difficult, let alone monitoring them. Thus, in most cases, answering the above simple questions may entail a lot of preparation, hard work and some experience.

The numbers of birds may be affected by a variety of factors including threats (see table 3). But they may also fluctuate through a natural process. It is therefore imperative that one takes this in consideration when monitoring the numbers of a population so that the natural fluctuations are not confused with the human-induced ones, whether it is pollution, direct persecution, introduction of alien species, or other similar threats.

One has also to ascertain that any changes detected by monitoring are actually occurring in nature and not simply a result of different measurements taken by different people or in slightly different ways. It is therefore useful to develop and implement a detailed and exacting *modus operandi* as part of any monitoring program, whether a short-term or a long-term one.

The development of a monitoring programme should consist of a framework, which includes:

- a) the goals and objectives;
- b) information on subject to be monitored;
- c) a sampling strategy and design;
- d) a clear method of data collection and handling.
- e) reporting.

Information about the natural history of the species involved is crucial in tailoring the methods to suit the situation. It is essential that those participating in any monitoring programme be well versed in the species' ecology and conservation. The success of any bird monitoring or research project hinges on the standard of the observers collecting the data.

Physical monitoring activities (such as counting, checking nest-sites, collecting biological data, etc) should be carried out preferably in good weather conditions. Heavy winds and rain for example, apart from providing difficult conditions to work in, may affect the quality of the data collected.

Modern technologies such as satellite tracking and geo-referenced data loggers, at least for the larger species, allow direct sampling at sea of the most used migratory and/or feeding routes, as well as very relevant information of the bird's behaviour. Identifying the breeding and non-breeding offshore areas constitutes a great challenge that can only be solved by using an integrated mixture of current technologies, albeit still rather expensive. Using individually tracked birds is an essential tool to identify feeding, moulting and or dispersing areas for some of the species dealt with here.

Data should be recorded on field forms, which should be standard to ensure compatibility of data taken between participants and on different dates of a monitoring program. Using maps and diagrams is an efficient way to record data, apart from helping in keeping track of locations of birds and nest sites.

As we are dealing mainly with colonial nesting birds it would be essential to compile a register for each colony. A register should include:

- a) A description of the study area and the breeding colony (colony name, location, status, description of habitat, any historical facts and counts, counting problems, percentage of the colony that can be properly investigated);
- b) Dates of visits;
- c) Counting methods used;
- d) Counts and data collected (number of individual birds on land, apparently occupied territories, apparently occupied nests, and notes on behaviour);
- e) Other relevant information.

Counts of birds in a colony should be carried out at least once during the breeding season. However if counts are repeated at different times during the breeding season better estimates of the breeding population in a particular colony can be achieved. Visiting the site before the fledging period is essential to investigate the breeding success rate within a colony. During counting, investigating nest sites, marking birds, taking biometrics, and other data collecting activities, one has to make sure to minimise disturbance as much as possible.

Capturing and marking under accepted protocols can abet the counting of birds and the estimation of population size. Marked individual birds assist in estimating population size, but also calculating survival rates, measuring dispersal and other movements and measuring the reproductive rate success of individual birds.

Counting methods may vary according to the species. Several methods are available for the gulls and terns (in this case the Audouin's Gull *Larus audouinii* and the three tern species *Sternula albifrons*, *Sterna sandvicensis* and *Sterna bengalensis*). One can physically count the apparently

occupied nest-sites, or estimate nest-sites by using line transects or quadrats. "Flushing" counts can also be carried out in isolated locations, particularly on small islands. Birds are rapidly counted when they fly up in the colony, and then the number of pairs are estimated. Rough estimates can also be made by aerial counts when flying over colonies. Aerial photography assists to have more accurate estimates.

Monitoring shearwaters (*Calonectris diomedea*, *Puffinus yelkouan* and *Puffinus mauretanicus*) in the Mediterranean is not an easy task, particularly in those areas where they breed in cliff faces. In most colonies only a small percentage of a colony can be monitored if one requires counting apparently occupied burrows. Burrow-nesting species should be counted by sampling procedures. Droppings, and other tracks and signs can determine presence and/or occupancy. An endoscope can be very useful, and very often the birds also respond to a tape-playback of their calls. This method of monitoring is best carried out during the egg-incubating period.

Monitoring rafts at dusk when they assemble waiting to visit the colony can also give results. This is best carried out before the egg-laying period, otherwise you may have also the non-breeders. One has to be careful in those situations where you may have breeding and non-breeding birds in the same study area. Experienced observers will be able to determine in situ, due to the birds' behaviour, which birds are breeders and which are not.

Capturing for marking and recapturing is vital for long-term monitoring of shearwaters. The same method of capture and recapture can be used for the European (Mediterranean) Storm-petrel *Hydrobates pelagicus melitensis*, which is even more difficult to detect, let alone count directly.

The "look-see" method is commonly used to assess the breeding populations of raptors. Low density and specialised nesting habitat in remote and inaccessible pose problems to monitoring a species such as the Osprey *Pandion haliaeetus*, particularly in the Mediterranean where it nests only on rocks or cliffs overlooking the sea. Initial monitoring efforts may include (a) locating and mapping nest-sites; and (b) checking number of nesting attempts, number of successful nesting, and number of fledged young.

With regards to the Slender-billed Curlew *Numenius tenuirostris* very little monitoring can be carried out due to the fact that it is now a very rare visitor in winter. But it is essential that one should keep a look out for the species when carrying out ornithological surveys of water birds wintering in the wetlands of the Mediterranean, particularly in those areas where the species has been recorded in recent years. Any sighting should be immediately reported to international bodies concerned with endangered bird species, particularly BirdLife International.

Due to their size and/or behaviour, the other species of the Annex are easier to locate although they may pose different problems when carrying out the actual monitoring at their breeding colonies. It is not the scope of these guidelines to go into the details for each species as the general guidelines for monitoring included here may be applied to all the species.

Although monitoring of species can be generally carried out all year round, for the purpose of the Action Plan's requirements, one should focus on the species during the breeding period. However for those species in this list, which also winter in the Mediterranean, and particularly the Pelican species (*P. onocrotalus* and *P. crispus*), it is also vital to monitor the wintering numbers. Monitoring the number of wintering birds in mid winter, preferably by counting birds at roosting sites, will give the desired results.

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Annex I : ANNUAL COLONY REGISTER								
SPECIES: _____								
Colony Name..... Locality..... Year.....								
visit no.	date	Individual birds	occupied nests	estimated breeding pairs		weather	methods used	recorder
				min	Max			
1								
2								
3								
4								
5								
6								
7								
8								
9								
visit no.	date	general observations and remarks						
1								
2								
3								
4								
5								
6								
7								
8								
9								

**Annual Colony Register:** Data sheet for counting colonial nesting birds covering a number of visits to a colony. One sheet per species within colony under observation.