TECHNICAL SERIES No. 24

AEWA

AEWA Conservation Guidelines No. 9

Guidelines for a waterbird monitoring protocol

landbouw, natuur en voedselkwaliteit

Swiss Agency for the Environment, Forests and Landscape SAEFL

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Introduction

In Article II of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds, Parties agree, as a fundamental principle, to take co-ordinated measures to maintain migratory waterbird species in a favourable conservation status or to restore them to such a status. To this end, the Parties agree to apply within the limits of their national jurisdiction a number of general conservation measures prescribed in Article III of the Agreement, as well as a number of more specific actions determined in the Action Plan appended to the Agreement. In paragraph 7.3 of the Action Plan, the Agreement Secretariat is required to co-ordinate the development of a series of Conservation Guidelines to assist the Parties in the implementation of their obligations under the Agreement. These Conservation Guidelines, which should be prepared in co-ordination with the Technical Committee and with the assistance of experts from Range States, were submitted to the First and Second Meetings of the Parties, which recommended publication after minor amendment, and further recommended regular review (Article IV, paragraph 4 of the Agreement). The Technical Committee keeps the guidelines under review, and formulates draft recommendations and resolutions relating to their development, content and implementation for consideration at sessions of the Meeting of the Parties (paragraph 7.6 of the Action Plan).

Paragraph 7.3 of the Action Plan gives a list of some of the topics that should be covered by the Conservation Guidelines. These are as follows:

(a) single species action plans;
(b) emergency measures;
(c) preparation of site inventories and habitat management methods;
(d) hunting practices;
(e) trade in waterbirds;
(f) tourism;
(g) reducing crop damage;
(h) a waterbird monitoring protocol.

Preparation of the Conservation Guidelines was identified as a major activity in the *International Implementation Plan for the Agreement of the Conservation of African-Eurasian Migratory Waterbirds 1997-1999*, prepared by Wetlands International in April 1997 with financial support from the Ministry of Agriculture, Nature Management and Fisheries in The Netherlands. Activity 3 of the *Implementation Plan* involved the preparation of nine sets of conservation guidelines, following the list in paragraph 7.3 of the Action Plan, but treating site inventories and habitat management methods as two separate topics. These Guidelines were accepted by the first Meeting of the Parties in Cape Town, South Africa, in November 1999, subject to minor amendment. The necessary amendments were made after discussion by the Technical Committee, and the amended version of the Conservation Guidelines was accepted by the second Meeting of the Parties to the Agreement in Bonn, Germany, in September 2002.

The nine sets of guidelines, as set out in the *Implementation Plan* and presented here, are as follows:

1. Guidelines on the preparation of Single Species Action Plans for migratory waterbirds

In paragraph 2.2.1 of the Action Plan, Parties are required to co-operate with a view to developing and implementing international single species action plans for populations listed in Category 1 in Column A of Table 1 as a priority and also for those populations listed with an asterisk in Column A of Table 1. Furthermore, in paragraph 2.2.2, Parties are required to prepare and implement national single species action plans for all those populations listed in Column A of Table 1 with a view to improving their overall conservation status. The Agreement Secretariat is required to co-ordinate the development, harmonisation

and implementation of these plans. The present guidelines focus on national single species action plans. They outline a standard procedure for the preparation of such action plans, and identify the priority species and populations occurring in the Agreement Area.

2. Guidelines on identifying and tackling emergency situations for migratory waterbirds

In some situations, populations of waterbirds can suddenly be subjected to much higher levels of mortality than normal. These emergency situations can arise as a result of natural phenomena, such as periods of exceptionally cold weather or prolonged droughts, or as a result of man-made disasters, such as major pollution incidents. International co-operation is required to address these situations without delay. In Article III, paragraph 2 (f) of the Agreement, Parties agree to co-operate in emergency situations requiring international concerted action and in identifying the species of migratory waterbirds, which are the most vulnerable to these situations. Furthermore, Parties agree to co-operate in developing appropriate emergency procedures to provide increased protection to these species in such situations. In paragraph 2.3 of the Action Plan, Parties are required, in close co-operation with each other whenever possible and relevant, to develop and implement emergency measures for populations listed in Table 1, when exceptionally unfavourable or endangering conditions occur anywhere in the Agreement Area. At its third session, the AEWA Technical Committee adopted criteria to define emergency situations, which require urgent conservation measures, and determined the modalities for assigning responsibility for action to be taken (Article VI, paragraph 7 (e) of the Agreement). The present guidelines identify many of the possible emergency situations that may arise, and outline procedures for establishing early warning systems and tackling these situations at national level.

3. Guidelines on the preparation of site inventories for migratory waterbirds

In Article III, paragraph 2 (c) of the Agreement, Parties are required to identify sites and habitats for migratory waterbirds occurring within their territory. More specifically, in Paragraph 3.1.1 of the Action Plan, Parties are required, in liaison where appropriate with competent international organisations, to undertake and publish national inventories of the habitats within their territory, which are important to populations listed in Table 1. Parties should endeavour, as a matter of priority, to identify all sites of international or national importance for populations listed in Table 1 (Paragraph 3.1.2). These guidelines develop a step-wise approach to the inventory process, which takes full advantage of existing regional and national wetland inventories and lists of sites important for migratory waterbirds.

4. Guidelines on the management of key sites for migratory waterbirds

In Article III, paragraph 2 (c) of the Agreement, Parties are required to encourage the protection, management, rehabilitation and restoration of sites and habitats for migratory waterbirds occurring within their territory. More specifically, in Paragraph 3.2.1 of the Action Plan, Parties are required to endeavour to continue establishing protected areas to conserve habitats important for the populations listed in Table 1 of the Action Plan, and to develop and implement management plans for these areas. These guidelines set forth the basic procedures for the design and implementation of management plans, with special reference to sites of importance for migratory waterbirds.

5. Guidelines on sustainable harvest of migratory waterbirds

If populations of migratory waterbirds are to be maintained in a favourable conservation status, it is essential that any exploitation of these populations be carried out on a sustainable basis. Article III, paragraph 2 (b) of the Agreement requires that Parties ensure that any use of migratory waterbirds is based on an assessment of the best available knowledge of their ecology, and is sustainable for the species as well as for the ecological systems that support them. In paragraph 4.1.1 of the Action Plan, Parties are required to co-operate to ensure that their hunting legislation implements the principle of sustainable use as envisaged in the Action Plan, taking into account the full geographical range of the waterbird populations concerned and their life history characteristics. The present guidelines promote the establishment of 'harvest frameworks' at both international and national levels, and identify a series of

steps to assist Range States in adopting a sustainable approach to the harvesting of waterbirds.

6. Guidelines on regulating trade in migratory waterbirds

Paragraph 7.3 of the Action Plan requires that guidelines be provided on the regulation of trade in waterbirds. Although it seems that there is relatively little international trade in migratory waterbirds in the Agreement Area, national (or domestic) trade can be very high, involving annual harvests of many thousands of birds for sale as food in local markets. In some areas, such trade may be of considerable importance to the local economies. These guidelines concern both international and domestic trade, and offer practical advice on how trade in waterbirds can be regulated within the framework of sustainable harvests.

7. Guidelines on the development of ecotourism at wetlands

The development of ecotourism based on spectacular concentrations of migratory waterbirds can not only increase support amongst the general public for waterbird conservation, but can also, if properly managed, provide a valuable source of income for local people with negligible harm to the environment. In Paragraph 4.2.1 of the Action Plan, Parties are required to encourage, where appropriate, the elaboration of co-operative programmes to develop sensitive and appropriate ecotourism at wetlands. Furthermore, in Paragraph 4.2.2, Parties are required, in co-operation with competent international organisations, to endeavour to evaluate the costs, benefits and other consequences that can result from ecotourism at wetlands with concentrations of waterbirds. The present guidelines examine a wide range of issues relating to nature-oriented tourism in general, and offer practical advice for the sensitive development of ecotourism at wetlands important for migratory birds.

8. Guidelines on reducing crop damage, damage to fisheries and other forms of conflict between waterbirds and human activities

Changes in population levels and distribution of waterbirds, combined with an intensification of agriculture and aquaculture, have led to increased conflicts between some waterbird species and human activities, notably agriculture, aquaculture, and commercial and recreational fisheries. With the great increase in air traffic in recent decades, many large waterbirds now pose a serious hazard to aircraft. In Paragraph 4.3.2 of the Action Plan, Parties are required to endeavour to gather information on the damage, in particular to crops, caused by populations listed in Table 1, and report the results to the Agreement Secretariat. In paragraph 4.3.3, Parties are required to co-operate with a view to identifying appropriate techniques to minimise the damage, or to mitigate the effects of damage, in particular to crops, caused by populations of waterbirds listed in Table 1. The present guidelines examine the major causes of conflict between migratory waterbirds and agriculture, fisheries and aviation, outline procedures for investigating the problems, and suggest a number of measures that can be taken to reduce the damage.

9. Guidelines for a waterbird monitoring protocol

Populations of all migratory waterbirds in the Agreement Area should be monitored on a continuous basis to determine population trends and to provide an early-warning system for species in difficulty. This will enable appropriate measures to be implemented before the populations fall to dangerously low levels. Paragraph 5.2 of the Action Plan requires that Parties endeavour to monitor the populations of waterbirds listed in Table 1, and make the results of such monitoring available to appropriate international organisations, to enable reviews of population status and trends. Paragraph 5.3 requires that they co-operate to improve the measurement of bird population trends as a criterion for describing the status of such populations. In Paragraph 5.8, Parties agree to co-operate with relevant international organisations to support research and monitoring projects. The present guidelines examine the value of monitoring in the conservation of migratory waterbirds, review existing monitoring practices, and provide guidance on the development of national waterbird monitoring schemes that are most appropriate for international conservation efforts.

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AEWA Conservation Guidelines No.9

Guidelines for a waterbird monitoring protocol

Prepared by Wetlands International

and

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Step chart

To establish and maintain a national waterbird monitoring scheme, each country should take the following steps:

Step 1: Draw up a list of sites for standardised monitoring of non-breeding waterbirds.

Step 2: Assemble a hierarchical network of observers, volunteers and professionals, as appropriate and available.

Step 3: Apply International Waterbird Census (IWC) methods to the monitoring of sites for non-breeding waterbirds.

Step 4: Consider the use of additional methods for monitoring species inadequately covered by standard methods.

Step 5: Create a computer database to allow management and use of the information collected.

Step 6: Ensure that optimum use is made of the information collected.

Step 7: Feed results into conservation policy.

Introduction

These guidelines are a summary of the waterbird monitoring practices at national level that are most appropriate for international conservation efforts. Conservation practitioners involved in waterbird monitoring at national level should follow the guidelines to enhance the quality of information available for international waterbird conservation.

Aims of waterbird monitoring

The main purpose of waterbird monitoring is to obtain objective, detailed and accurate information about the conservation status of each population of waterbird (see Box 1). This information forms a crucial basis for nature conservation policy at local, national and international levels.

Box 1: What is monitoring?

Monitoring is the measurement of variables over time with specific objectives in mind. The specific objectives of waterbird monitoring are the maintenance of baseline populations of waterbirds, and maintenance of favourable trends in waterbird populations.

The basis for much conservation action is provided by monitoring. Decisions about which waterbird species are most in need of conservation action, and judgement of the effectiveness of such action, can only be made if the numbers and distribution of waterbirds are closely monitored.

A large number of waterbird species are monitored in many countries in all seasons using a great variety of specific and generic methods. It is beyond the scope of these guidelines to summarise all these techniques and monitoring schemes. For information about many diverse monitoring methods, readers are referred to detailed manuals and handbooks, *e.g.* Gilbert *et al.* (1998) and Ecoscope (in press).

Numbers and distribution of populations

One of the most important uses made of waterbird count information is estimation of the number and distribution of individuals in different populations. As knowledge of waterbird populations increases, it becomes possible to set minimum baseline levels below which it is considered undesirable for populations to decline.

Priority species for monitoring are:
- globally threatened species;
- species listed in Table 1 of the AEWA Action Plan;
- at national level, species for which the country holds a large proportion of the population at some point in their annual cycle.

However, an important principle is that all waterbird species should be monitored equally. Whilst monitoring is able to provide information that is useful to the conservation of threatened species, a crucial aim is to monitor the fortunes of more numerous and widespread species for which even quite large changes in status and distribution might otherwise go unnoticed.

Population trends

Counts of waterbirds should be obtained on a regular basis, and in a standardised, routine manner. The frequency of counts should be regular enough to detect trends quickly. If this is done, it is possible to recognise the trends in numbers exhibited over time by different populations. This allows populations in decline, and those that are increasing, to be identified, and the rates of change to be estimated.

Conservation action for declining populations should be given the highest priority. Management in response to population increase may also be necessary.

Monitoring should continue in the long term, so that the consequences of any conservation or management actions are themselves monitored.

Identification of flyways and populations

For conservation purposes, waterbird biologists are increasingly studying birds at the level of individual populations and flyways. If key sites for each population throughout its life cycle can be identified (breeding, moulting, staging and wintering sites), the flyways used by different populations can be identified, and conservation of each population at a flyway level becomes possible.

Site importance

All waterbirds require a network of high quality sites for nesting, for moulting, for 'refuelling' during migration, and for surviving the non-breeding season. The best method of assessing the importance of a site for waterbirds is to organise regular counts of the waterbirds that use it. The overall numbers of birds and the proportions of each population at a site revealed by counting can then be used as an objective basis for assessing its importance.

Sites that are monitored should include:

- all sites designated under the Ramsar Convention as wetlands of international importance, and other sites with international or national designations because of their importance for waterbirds;
- as many additional sites representative of the country's wetlands as it is possible to count on at least an annual basis.

The International Waterbird Census

For practical reasons, these guidelines concentrate on monitoring during the non-breeding season using methods developed under the International Waterbird Census (IWC), co-ordinated by Wetlands International since 1967. Waterbird monitoring already takes place in a majority of countries in the AEWA area as part of the IWC. The objectives of this Census are well established and the methods very successful (see Box 2). Guidelines for census techniques that complement IWC methodology and cover species inadequately monitored by the IWC are included in Step 4. Some of these additional methods include monitoring of waterbirds during the breeding and migration seasons, but the emphasis of these guidelines is on monitoring during the middle of the non-breeding season (*i.e.* 'mid-winter' period).

Box 2: The International Waterbird Census (IWC)

At present, the IWC is the principal means by which the monitoring and research requirements under AEWA are met.

Objectives of IWC:

The International Waterbird Census uses information collected by four regional censuses over the long term:

- To monitor the numerical size of waterbird populations
- To describe changes in numbers and distribution of these populations
- To identify wetlands of international importance for waterbirds at all seasons
- To provide information to assist protection and management of waterbird populations through international conventions, national legislation and other means

The IWC operates as four separate surveys:

- The Neotropical Waterbird Census,
- The Asian Waterbird Census,
- The African Waterbird Census,
- The Western Palearctic and Southwest Asia Waterbird Census.

- The IWC began in Europe, North Africa and the Middle East in 1967.
- Sites are counted in January, the month when inter-site movements by most waterbirds in the Northern Hemisphere are at a minimum. In sub-Saharan Africa, an additional July count is made.
- In the first years of the IWC, most participating countries included only *Anatidae* (ducks, geese and swans) and Common Coot (*Fulica atra*) in the counts.
- During the next 35 years, counting spread to more countries, and to additional groups of waterbirds.
- By 2000, most countries in the region were operating monitoring programmes that counted a majority of waterbird species.
- The African Waterbird Census began in 1991, using methodology based on work already carried out in the Western Palearctic.
- High quality reports are produced which provide feedback to counters and give incentive to maintaining and expanding the census.

Step 1: Draw up a list of sites for standardised monitoring of non-breeding waterbirds

The process of drawing up a site list is described in Guidelines No.3: *Guidelines on the preparation of site inventories for migratory waterbirds.*

Many countries in the AEWA area already conduct waterbird monitoring at a number of sites, and some have comprehensive waterbird monitoring schemes. It will nevertheless be a valuable exercise to follow the steps outlined in Guidelines No.3.

The first priority of any national waterbird monitoring scheme should be to select a sample of wetlands where it is possible to conduct regular counts in a standard way. These sites should be given the highest priority for counting each January, and also each July in sub-Saharan Africa.

- Sites selected by following Guidelines No.3 should form the basis of this priority site list.
- If resources allow, this sample of priority sites should be extended to include sites representative of all the wetlands in the country.
- The sample should include as many of the country's wetlands designated under the Ramsar Convention and as many other internationally and nationally designated sites as possible.

In this way, a high proportion of waterbirds will be counted.

Step 2: Assemble a hierarchical network of counters, volunteers and professionals, as appropriate and available

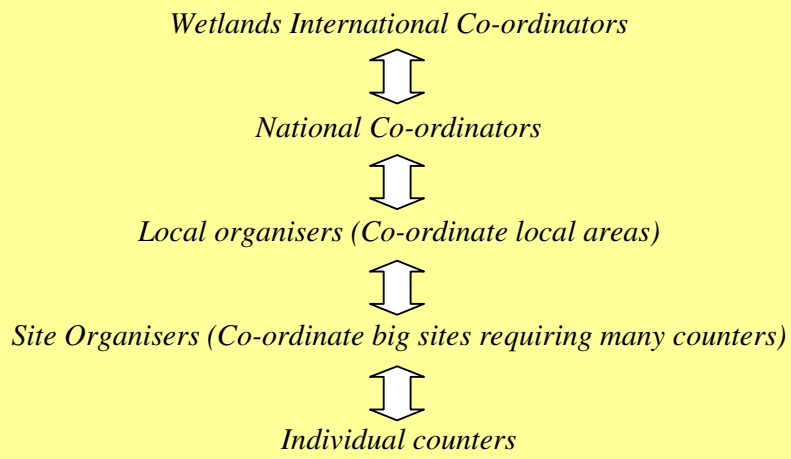
Successful waterbird monitoring at the international level cannot exist without good organisation at national and local levels. Waterbird monitoring schemes may be based in governmental or non-governmental organisations or research institutes, and may receive input from all of these types of body.

The best way to organise waterbird monitoring at a large number of wetlands in a country is through a hierarchical structure of organisation (see Box 3).

- A national co-ordinator is appointed who has overall responsibility for the census in the country.
- Local organisers (often volunteers) co-ordinate counts in different regions of the country.
- A number of counters (also often volunteers) are then responsible for counts at individual sites within each region of the country.
- At big sites, which are divided for the purposes of counting into a number of sub-sites, counters are organised into teams, and a site organiser reports to the local organiser.

Box 3: A National Waterbird Monitoring Network

This diagram represents a simple national waterbird monitoring network. Instructions flow down from the national co-ordinator, and count information flows up from the individual counters. This system is commonly adopted throughout the AEWA area. Professional input is often restricted to national co-ordination and the analysis and publication of results.



For international overviews produced under the International Waterbird Census, the national co-ordinators send all January counts from Europe, North Africa and Southwest Asia to Wetlands International's co-ordinators in Wageningen, The Netherlands, and all January and July counts from sub-Saharan Africa to the co-ordinator of the African Waterbird Census in Dakar, Senegal.

This system of organising waterbird monitoring is extremely productive and cost-efficient. In many countries, voluntary counters contribute thousands of hours of highly skilled survey work every year, free of charge. Such voluntary effort is best organised professionally. Enormous value is added to the costs incurred by professional organisation where this system is adopted.

In countries lacking a tradition of hobby bird watching, a different approach is necessary. In these countries, annual expeditions by volunteer birdwatchers and conservation professionals

from governmental and non-governmental organisations and research institutes cover a sample of priority sites.

Training

In countries where waterbird monitoring is still small in scale, the training of professional and voluntary counters should be undertaken as a high priority. Training should concentrate on two main areas:

- Field techniques (how to identify and count birds);
- Data management techniques (how to collect, store, analyse and interpret waterbird monitoring data).

Step 3: Apply IWC methods to the monitoring of sites for non-breeding waterbirds

The most important element of waterbird monitoring methodology is standardisation.

The top priority of National Co-ordinators should be to count the same sites in the same way every year. Comparisons between countries and years are then straightforward and valid. Counts additional to the January and July (Africa) censuses are extremely valuable, and should be organised at national level when resources allow.

Field Methods

The methods used to count waterbirds in the field depend on many factors, for example:

- the species being monitored;
- the size of the site;
- the accessibility of the shoreline;
- the availability of vantage points from which the site can be scanned;
- the amount of time available to complete the count;
- the number of people involved;
- the available equipment.

- Many large or complex sites are divided into sub-sites for the purposes of counting. Each sub-site is a separate count unit. It is best if counting of sub-sites is closely co-ordinated and simultaneous, with one counter per site unit, especially at tidal sites where birds move around in response to the tidal cycle.
- Identifying the best vantage points can take a number of visits to the site in different conditions. The proportion of birds using a site that are registered by counts can be considerably improved by local knowledge of:
  - tidal conditions;
  - best light conditions at different vantage points;
  - periods of maximum disturbance;
  - other local variables which affect counting efficiency.
- Counts are usually made by scanning flocks of waterbirds (which usually comprise several species) with a telescope or with binoculars as appropriate. Flocks should usually be scanned several times, and birds counted one or two species at a time. If time allows, repeated scans can be used to obtain a consistent estimate, *i.e.* to improve the precision of the count. Scanning repeatedly has the additional advantage of maximising the chances of finding small, inconspicuous or rare species present in small numbers.
- A tally counter can be used to speed up this process and reduce errors. Some experienced observers use two or more tally counters simultaneously, and allocate a separate count of a different species to each.
- Large flocks introduce an inherent bias; small sites with few birds can be counted with greater accuracy than large sites with many birds.
- Birds should be counted one at a time at small sites. This procedure can be adopted at larger sites if there is no shortage of time. However, it is usually preferable to count faster than this to prevent problems caused by birds moving about in response to the tidal cycle or to disturbance.
- Experienced counters can accurately estimate 10, 20, 50, 100 or more birds almost instantaneously, and scan through flocks counting in these units with a tally counter.
- Flocks of birds in flight are often best counted from the back of the flock, scanning in the direction of flight with binoculars or a telescope.
- Records should be kept in a notebook (using a pencil in case of rain), or recorded on a small tape recorder.
- Counts from boats may be suitable at some sites, for example lakes and rivers fringed with vegetation. Some of the difficulties with boat surveys include:
  - low vantage point;
  - the inability to use a telescope;
  - disturbance of birds caused by the boat.

- Aerial survey is the best method for counting extensive, inaccessible areas, for example offshore waters and extensive river floodplains. Some of the difficulties with aerial surveys include:
  - high expense;
  - the considerable practice required to produce consistent results at high speed;
  - a very specialised technique, for which a separate instruction manual was produced by IWRB (now Wetlands International) (Komdeur *et al*., 1992).

The importance of mapping sites

Guidelines No.3: *Guidelines on the preparation of site inventories for migratory waterbirds* explain some of the uses of mapping. The mapping of sites plays a crucial role in successful waterbird monitoring.

- If possible, the total wetland area within each site should be counted. A map should be used at every site counted. The boundary of the area counted and any special vantage points used should be marked on the map. The main reason for this is to ensure consistency of coverage from year to year. When counters retire and new ones begin counting a site, it is crucial that coverage continues as it did before. Copies of all site maps should be kept by local and national co-ordinators of every national waterbird monitoring scheme.
- The area counted by each observer is called a count unit, and may comprise a single, self-contained site, or part of a larger, complex site.
- The map should be checked before (and, if necessary, during) every count, and at complex sites counted by a team, the site co-ordinator should ensure that everybody knows precisely the boundary of the count unit for which they are responsible.
- Mapping is extremely important at temporary wetlands and those with boundaries that vary according to the extent of seasonal flooding. Similarly, the extent of freezing at wetlands in cold climates should be recorded.
- At sites designated as Ramsar Sites or having other international or national status (*e.g.* nature reserves), the boundaries should coincide with the boundary of the designated area wherever possible. If a larger area is counted than that designated, the designated area should be counted as a sub-site of the whole so that species totals for the designated area can be calculated.

Step 4: Consider the use of additional methods for monitoring species inadequately covered by standard methods

All waterbird species should be counted during the January IWC counts (and the July IWC counts in sub-Saharan Africa). However, not all waterbird species can be adequately monitored using the standard approach outlined above. The methods outlined in this step will adequately monitor many additional species. Further methods, which are beyond the scope of these guidelines, can be found in specialised handbooks and manuals, such as *Bird Monitoring Methods: a manual of techniques for key UK species,* published by the Royal Society for the Protection of Birds in the U.K. in 1998, and *A species and habitats monitoring handbook*, currently being produced by Ecoscope Applied Ecologists.

Waterbird species well covered by IWC methodology: Analyses of data from the International Waterbird Census have shown that standardised counts in the non-breeding season can be used to obtain adequate population estimates and trends for a majority of swans, geese and ducks (*Anatidae*), Common Coot *Fulica atra*, and many populations of grebes (*Podicipedidae*), cormorants *(Phalacrocoracidae*) and waders (*Haematopodidae*, *Recurvirostridae*, *Charadriidae* and *Scolopacidae*). IWC methods work well for these species because their populations often congregate at a relatively small number of sites during the non-breeding season.

Waterbird species best counted at communal roosting sites: Some species, for example geese (*Anser* spp. and *Branta* spp.), waders (*Haematopodidae*, *Recurvirostridae*, *Charadriidae* and *Scolopacidae*), herons and egrets (*Ardeidae*) and gulls and terns (*Laridae*), form large, concentrated roosts outside the breeding season. Counts of some roosts, for example waders at high tide, may be included in the IWC methodology described above. Other roost counts, for example of geese, should only be undertaken as part of a specially organised monitoring scheme, to ensure that birds at the roosts are not double-counted at their feeding sites.

Colonially nesting waterbird species: Some species congregate at colonies during the breeding season, and closely co-ordinated counts at this time may be very productive. Many species in the following taxa can be counted at their colonies: pelicans (*Pelecanidae*), cormorants (*Phalacrocoracidae*), herons and egrets (*Ardeidae*), storks (*Ciconiidae*), ibises and spoonbills (*Threskiornithidae*), flamingos (*Phoenicopteridae*), and gulls and terns (*Laridae*). Many successful surveys of colonial nesting waterbirds have been carried out at the national level, and it may be possible in future to produce international analyses for some species.

Waterbird species with very dispersed distribution: Some numerous species distribute themselves thinly over the available landscape. Typical examples are the Mallard *Anas platyrhynchos* and Egyptian Goose *Alopochen aegyptiacus*. Only a small proportion of the populations of these species is included in counts. If the assumption is made that the same proportion of the populations of these species are counted each season, count data can provide a basis for estimates of population trends, even if they shed little light on actual numbers. That is, as long as the under-estimate remains constant between years, the monitoring scheme can be applied to species where only a relatively small proportion of the total is counted.

Waterbird species that congregate away from wetlands: Many waterbirds use offshore habitats and habitats away from wetlands, such as farmland and rubbish tips. Offshore habitats are preferred by seaducks (*e.g. Somateria* spp. and *Melanitta* spp.), divers (*Gaviidae*), and some populations of grebes (*Podicipedidae*) and cormorants (*Phalacrocoracidae*). These species are best counted by aerial or ship surveys, which by their nature can usually only be conducted occasionally, for example every five years. Species making habitual use of farmland in Europe and Western Asia include most species of geese (*Anser* spp. and *Branta* spp.) and Northern Lapwing (*Vanellus vanellus*). Other lapwings of

the genus *Vanellus* are often found far away from wetlands in Africa. Many species of gulls *Larus* spp. occur in large concentrations at rubbish tips.

Waterbird species that congregate in the region at times other than midwinter: The standard IWC methods, because they use data from the non-breeding season only, miss important congregations of waterbirds during migration and other periods. Many Arctic nesting wader populations pass through Europe and Southwest Asia during spring and autumn migration *en route* to wintering areas in Africa. It is very important that national programmes should include surveys during migration times to monitor these birds. The identification of key sites for species on passage should be included as an aim of national waterbird monitoring schemes wherever possible.

Waterbird species with skulking behaviour: Two groups of waterbirds well-known for skulking in dense vegetation, out of sight of observers, are the snipes (*Gallinago* spp. and *Lymnocryptes minimus*) and most species of crakes and rails (*Rallidae*). Successful surveys of these groups pose particular challenges (see Box 4). As with widely dispersed species (see above), the assumption can be made that the proportion of these species missed by counts remains similar from year to year. It is therefore possible to use count data to obtain an indication of population trends of some species, although the absolute numbers remain unknown.

Box 4: Monitoring skulking species

Snipes (*Gallinago* spp. and *Lymnocryptes minimus*) are killed in large numbers by sport hunters. Hunting bags have been used to indicate the relative numbers of different species and variations in numbers from year to year. Shot birds can be aged, so that the proportion of birds of the year in the population can be used to give an indication of variations in breeding productivity.

Crakes and rails (*Rallidae*) are among the most skulking of birds, and many species remain very poorly known. Methods of monitoring need to be developed because at present, it is possible that even a catastrophic decline in some of these species would go unnoticed. Possible monitoring methods include intensive nocturnal surveys of calling birds during the breeding season. Detection rates could be increased by registering the response to playback of pre-recorded calls.

Waterbird populations that are hunted: Parts surveys, including wing and tail collections, can be used to monitor annual productivity, as well as age and sex compositions of wintering populations.

Threatened waterbird species: Special efforts are required to monitor rare and globally threatened species. Where threatened species are known to occur, special attention should be given to monitoring them at as many stages of their annual cycle as possible. Threats and potential threats should also be closely monitored. Globally threatened species occurring in the AEWA area are listed in Guidelines No.1: *Guidelines on the preparation of Single Species Action Plans for migratory waterbirds* and in Appendix II.

Counts at wetlands affected by freezing, floods and drought: Many wetlands vary in their extent each season as a result of freezing, flooding or drought. A careful record should be kept of the extent of flooding or freezing each season, and of the extent of coverage achieved by counters. This information should be recorded on maps. The extent to which some species concentrate and the location of the main concentrations are closely related to the distribution and extent of these changeable wetlands each season. For example, the distribution of Garganey *Anas querquedula*, Ruff *Philomachus pugnax* and Purple Heron *Ardea purpurea* in West Africa depends largely on variations in the nature and extent of flooding each season. The distribution of Smew *Mergellus albellus* in Europe each winter is similarly affected by the extent of freezing in Northern and Eastern Europe.

Step 5: Create a computer database to allow management and use of the information collected

A number of commercially available software packages have made data management easier in recent years. Information about counts and sites is usually stored on a database, and spreadsheet, mapping, graphics and statistics packages are available which allow clear and simple analysis, presentation and interpretation of the information.

Recording Forms

- Standard forms should be used to record waterbird count data. Many national schemes use their own recording forms, and Wetlands International produces forms for the International Waterbird Census for use in countries where organisers prefer this.
- The form lists all waterbird species found in the country, and requires, as a minimum, the name of the site, the date of the count and the number of each species counted.
- It is very important to record whether any waterbird species are present at a site but not counted. The design of the form should make it clear whether the lack of a count of a particular species is because the species was not present, or because it was not counted.
- Additional information relating to factors such as weather conditions, water level and disturbance may also be recorded.
- One of the most important tasks undertaken by national and local co-ordinators each year is the distribution of forms to the counters. This gives organisers the opportunity to discuss the season's counts and any anticipated problems.
- The local and national co-ordinators are responsible for retrieval of completed forms at the end of each season.
- After the season's forms are returned to national co-ordinators, they should be carefully checked, and have standard site codes added. The code is unique to each site, and the same codes should be used for the same sites each season.

Computerising data

- After forms are checked and coded, the information on them should be input to computer. It is vital that checks are carried out at this stage to ensure that inputting errors are minimised.
- The best way to minimise inputting errors is to type all data into the computer twice. One version is then subtracted from the other, and any inputting errors are revealed.
- In countries that do not yet use computers to manage their data, the forms are sent directly to the international co-ordinators for computerisation.
- Countries that computerise their data should send them electronically to the international co-ordinators. Wetlands International advises national co-ordinators about the most appropriate software to use, and the best format for submitting the January data for international analysis.

Databases

- Computer databases are used to store and summarise information collected by waterbird counters.
- Box 5 gives a simple example of a good way to summarise waterbird count information in database tables.
- Modern database software is very flexible. Additional tables linked to the table of counts may store information about counters' contact details, or conditions of weather and disturbance at the site during a count. It is also a relatively simple matter to export data to graphics or mapping software packages, or to perform statistical analyses when required.

Box 5: Example of a simple waterbird count database

Such a database might consist of a table with information summarised in columns (or 'fields') under the following headings: **site name**, site **co-ordinates**, **date** of count, **species**, number **count**ed. A new row of the table is used to present each separate count of each species. An example of a database with this structure follows. To save space and typing, species codes are used:

site name	**co-ordinates**	**date**	**species**	**count**
West Lake	45°37'N35°47'E	150104	ANAPL	162
West Lake	45°37'N35°47'E	150104	FULAT	547
West Lake	45°37'N35°47'E	150104	CYGOL	38
Blue Bay	48°16'N32°58'E	160104	ANAPL	20
Blue Bay	48°16'N32°58'E	160104	TACRU	1

The computer software is capable of producing all kinds of different summaries of the data once it is entered in this table format. A database with this structure has the advantage of being very simple, but also the considerable disadvantage of repeating a lot of information. The site name and co-ordinates are repeated for every count of each species. If this simple database structure were used for summarising data at national and international levels, the amount of repetition would be enormous. Site details would need to be entered for every count of every species in every year, and computing capabilities would soon be overwhelmed.

It is much more efficient to create separate tables, one with information about the sites, the other holding the count information. This approach applied to the example above would result in tables that look like this:

Site table:

site code	site name	co-ordinates
1234	West Lake	45°37'N35°47'E
5678	Blue Bay	48°16'N32°58'E

Count table

site code	date of count	species	count
1234	150104	ANAPL	162
1234	150104	FULAT	547
1234	150104	CYGOL	38
5678	160104	ANAPL	20
5678	160104	TACRU	1

The creation of an additional column, site code, on both tables, allows the information on the two tables to be linked. Site codes may be chosen by national organisers or at international level. The crucial feature of a site code is that it should be unique to the site, and that the same code should be used for each site in each season. Data forms should always be checked by national co-ordinators, and at this stage it is relatively simple to add the correct unique code to each form.

Site consolidation

- At sites that are divided for counting into a number of smaller count units (sub-sites), each count unit is treated as an ordinary site and given a unique site code.
- A second code then needs to be generated for the entire site, to enable the software to consolidate all the different count unit totals from the site into one overall total.
- These consolidation codes also need to be unique, and a database table with two fields relating all site codes to their respective consolidation codes needs to be created.
- This can then be linked to the table of sites and the table of counts to generate site totals at the level of consolidated sites.
- If a site code is changed on the site database, every record relating to that site also needs to be changed on the count database. Some database software packages automatically make these changes through links established between the different tables.
- To be certain of retaining the integrity between the site database and count database for every country, each country should submit its total data set to the international co-ordinators, including information going back to the time when counts were first started, every year.
- This will obviously only be possible for countries, which have well-established computerised data management systems for their waterbird monitoring schemes.

Local, national and international databases

- Local organisers should return forms to their national co-ordinator promptly each year, and the information should be entered into the computer at the sub-site level.
- All information relating to every count unit should be maintained.
- For international analyses, information is usually required at the level of consolidated sites, and it is most convenient for international co-ordinators to receive data from large, complex sites already consolidated.

Accommodating changes

National waterbird count databases change every year. The new season's counts are added, and it is usual for changes to be made to the site list because of new sites being covered. National co-ordinators should inform international co-ordinators about all changes to the site list. The simplest way to do this is to submit a new site list every year, together with the new year's counts.

Step 6: Ensure that optimum use is made of the information collected

Summary of numbers and distribution

National co-ordinators should submit data for international analysis within one year of the count date.

National population estimates derived from count information can be used as the basis for identifying nationally important sites. Sites regularly holding 1% or more of the national population estimate can be said to qualify as being nationally important for the population in just the same way as sites regularly holding 1% of flyway populations qualify as being internationally important. Identifying sites on this basis should benefit national nature conservation policy, and should afford sites important for waterbird conservation some protection from development.

Identification of population trends

Simply comparing the number of birds counted in a country each year is not valid as an approach to trend analysis because of differences in coverage of sites from year to year. In order to identify population trends, it is necessary to achieve consistent coverage of a large sample of sites used by each population over a period of at least five years. A number of methods are available which make allowance for the missing values that result from changes in coverage of sites between seasons, but these methods can only be used if the number of missing values is relatively small.

Identification of key sites

Data from waterbird monitoring is used in the identification of key sites, as explained in Guideline No.3: *Guidelines on the preparation of site inventories for migratory waterbirds*

- Two of the Ramsar criteria for the identification of wetlands of international importance are based on the numbers of waterbirds present.
- It is relatively straightforward to extract sites that meet these criteria from the international databases, but the resulting lists are at present incomplete.
- Restriction of IWC data to the months of January and July (Africa) limit the capability of the international databases to identify key sites.
- Data collected at national level from other times of the year are therefore extremely important in the identification of key sites.
- It is highly desirable to organise national counts more than once a year, although the annual January and July (Africa) counts are the most important and should therefore be regarded as the minimum.

Identification of key sites for waterbirds away from wetlands, for example in the Arctic breeding grounds, is usually beyond the scope of national waterbird monitoring schemes. Important offshore areas may be identified by aerial and ship surveys.

Dissemination of results

Regular publication of results is very important in maintaining enthusiasm for waterbird monitoring among observers at national level.

- An annual report should be produced, or results should appear annually in a widely available ornithological journal.
- These reports do not need to be long and complicated. Simple summaries of the total numbers of birds counted and comparison with earlier seasons may be all that is required.
- An annual summary of results may reveal developments in the numbers of a particular species that require conservation or management action.

- If annual reports are kept simple, periodic reports with a more detailed analysis are desirable every three to five years.

Step 7: Feed results into conservation policy

Different uses at different scales

At the local scale, information collected by waterbird monitoring is often used in planning decisions and Environmental Impact Assessments.

Also at national level the information collected is used in planning decisions and Environmental Impact Assesments. Furthermore at the national scale, the information may be used by public inquiries into potentially damaging developments. Waterbird monitoring information also forms the basis of national designation of protected sites, and of Important Bird Areas (IBAs) recognised by BirdLife International.

At international level, waterbird monitoring information is used in support of the Ramsar Convention on Wetlands, the African-Eurasian Waterbird Agreement, and the Biodiversity Convention, and is also used as a basis for regional agreements, species management plans and species conservation action plans.

The information gained from waterbird monitoring has additional value as an education and public awareness tool, especially in Africa. The collection of new, baseline information about many species is a further valuable aspect of waterbird monitoring in Africa.

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Ramsar sites directory
http://www.wetlands.org/RDB/Directory.html
Ramsar Information Sheet
http://www.ramsar.org/key_ris_index.htm
Ramsar Information Sheet explanatory notes and guidelines
http://ramsar.org/key_ris.htm#note
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New guidelines for management planning for Ramsar sites and other wetlands
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Useful web sites

The International Ecotourism Society TES
http://www.ecotourism.org
The World Travel & Tourism Council WTTC
http://www.wttc.org
The World Tourism Organisation WTO
http://www.world-tourism.org
United Nations Environment Programme, Industry and Environment, UNEP-IE: Tourism
http://www.unepie.org/tourism

8. REDUCING CROP DAMAGE, DAMAGE TO FISHERIES, BIRD STRIKES AND OTHER FORMS OF CONFLICT

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Useful web sites

Bird strikes
http://www.birdstrike.org/birds.htm
www.airsafe.com
Conflict between fisheries and waterbirds
http://www.cormorants.info/pdfs/WM14.pdf
http://banchory.ceh.ac.uk/conflict/case_studies/case%20studies.htm
Costs and benefits of managing wild geese in Scotland
http://www.scotland.gov.uk/cru/kd01/purple/cbmwgs-05.asp

9. WATERBIRD MONITORING PROTOCOL

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Useful web sites

Wetlands International - International Waterbird Census
IWC brochure (global): http://www.wetlands.org/IWC/about.htm

Manuals for IWC coordinators and counters: http://www.wetlands.org/IWC/Manuals.htm

African Waterbird Census, reports, news, recording forms:
http://www.wetlands.org/IWC/africa/africa.html

Western Palearctic and Southwest Asia Waterbird Census, Background information and reports: http://www.wetlands.org/IWC/wpal&swa/wpal.htm

IWC publications: http://www.wetlands.org/IWC/wpal&swa/output/about.htm

Census procedures and recording forms for Africa, Western Palearctic and Southwest Asia:
http://www.wetlands.org/IWC/docs/census_proc.htm

Western Palearctic and Southwest Asia, national site lists (clickable map):
http://www.wetlands.org/IWC/wpal&swa/output/sites.htm

Western Palearctic and Southwest Asia, national coverage history, 1967-1996 (clickable map):
http://www.wetlands.org/IWC/wpal&swa/output/coverage.html

Western Palearctic and Southwest Asia: National Coordinators of waterbird monitoring:
http://www.wetlands.org/IWC/wpal&swa/partner/WPalNC.htm

Asian waterbird Census, information, Coordinators, reports, news:
http://www.wetlands.org/IWC/awc/awcmain.html

Avian Demography Unit, University of Cape Town
http://www.uct.ac.za/depts/stats/adu/

Patuxent Wildlife Research Center: Colonial Waterbird Inventory and Monitoring
http://www.pwrc.usgs.gov/

US Fish & Wildlife Service, Division of Migratory Bird Management, Bird Monitoring
http://migratorybirds.fws.gov/statsurv/mntrtbl.html

Useful contacts

General

African-Eurasian Waterbird Agreement
UNEP/AEWA Secretariat
UN-Premises, Martin-Luther-King-Str. 8
53175 Bonn, Germany
Tel: (+49) 228 815 2413
Fax: (+49) 228 815 2450
E-mail: aewa@unep.de
WWW: http://www.unep-aewa.org

Bern Convention Secretariat (Secretariat of the Convention on the Conservation of European Wildlife and Natural habitats)
Environment Conservation and Management Division
67075 Strasbourg Cedex
France
Tel.: +33-3-88413559/2256
Fax: +33-3-88413751
E-mail: gill.steimer@coe.int
WWW: http://www.nature.coe.int/english/cadres/bern.htm

BirdLife International
Wellbrook Court
Girton
Cambridge CB4 3QX
United Kingdom
Tel.: +44-1223-277318
Fax: +44-1223-277200
E-mail: birdlife@birdlife.org
WWW: http://www.birdlife.org/

CBD Secretariat - Secretariat for the Convention on Biological Diversity
World Trade Centre
393 St. Jacques Street
Office 300
Montréal, Québec H2Y 1N9
Canada
Tel.: +1-514-2882220
Fax: +1-514-2886588
E-mail addresses: http://www.biodiv.org/secretariat/contact.asp
WWW: www.biodiv.org

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
UNEP/CMS Secretariat
United Nations Premises in Bonn
Martin-Luther-King Straße 8
53175 Bonn
Germany
Tel.: +49-228-815-2401 and +49-228-815-2402
Fax: +49-228-815-2449
E-mail: secretariat@cms.int
WWW: http://www.cms.int

Council of Europe

Environment Conservation and Management Division
Palais de l'Europe
Avenue de l'Europe
67075 Strasbourg Cedex
France
Tel.: +33-3-88412253
Fax: +33-3-88413751
E-mail: infopoint@coe.int
WWW: http://www.coe.int

EC - European Commission
Wetstraat 200
1049 Brussels
Belgium
Tel.: +32-2-2351111
E-mail: europawebmaster@cec.eu.int
WWW: www.europa.eu.int/comm/index.htm

ECNC - European Centre for Nature Conservation
PO Box 1352
5004 BJ Tilburg
The Netherlands
Tel.: +31-13-4663240
Fax: +31-13-4663250
E-mail: ecnc@ecnc.org
WWW: www.ecnc.nl

International Council for Game and Wildlife Conservation (C. I. C)
PO Box 74
H - 2092 Budakeszi
Hungary
Tel: 0036 60 444 647
Fax: 0036 60 444 648
E-mail: budapestoffice@cic-wildlife.org
WWW: http://www.cic-wildlife.org/

IUCN - the World Conservation Union
28, rue Mauverney
1196 Gland
Switzerland
Tel.: +41-22-9990001
Fax: +41-22-9990002
WWW: www.iucn.org
E-mail addresses at: http://www.iucn.org/wl/db/sitefeedback.cfm

IUCN/ELC - Environmental Law Centre
Adenauerallee 214
53113 Bonn
Germany
Tel.: +49-228-2692231
Fax: +49-228-2692250
E-mail: http://www.iucn.org/themes/law/elc01.html

Ramsar Convention Bureau
28, rue Mauverney
1196 Gland
Switzerland
Tel.: +41-22-999-0170
Fax: +41-22-999-0169
E-mail: ramsar@ramsar.org

WWW: www.ramsar.org

UNEP - United Nations Environment Programme
PO Box 30552
Nairobi
Kenya
Tel.: +254-2-621234
Fax: +254-2-226890 and +254-2-215787
E-mail addresses: http://www.unep.org/Contacts/
WWW: www.unep.org

UNESCO/MAB - Man and Biosphere Programme
Ecological Sciences Division
1, rue Miollis
75732 Paris Cedex 15
France
Tel.: +33-1-45684151
Fax: +33-1-40659897
E-mail: mab@unesco.org
WWW: http://www.unesco.org/mab/

UNESCO/WHC - World Heritage Centre
Place de Fontenoy 7
75352 Paris Cedex 07
France
Tel.: +33-1-45681443
Fax: +33-1-40569570
E-mail: wh-info@unesco.org
WWW: www.unesco.org/whc

UNEP - WCMC - World Conservation Monitoring Centre
219, Huntingdon Road
Cambridge CB3 0DL
United Kingdom
Tel.: +44-1223-277314
Fax: +44-1223-277136
E-mail: info@unep-wcmc.org
WWW: http://www.unep-wcmc.org/

Wetlands International
PO Box 471
6700 AL Wageningen
The Netherlands
Tel.: +31-317-478854
Fax: +31-317-478850
E-mail: post@wetlands.org
WWW: www.wetlands.org

WWF-International - World Wide Fund for Nature
Avenue du Mont-Blanc
1196 Gland
Switzerland
Tel.: +41-22-3649111
Fax: +41-22-3642926
E-mail addresses: http://www.panda.org/about_wwf/who_we_are/offices/offices.cfm
WWW: www.panda.org

Species Action Plans

IUCN Species Survival Commission
c/o IUCN (see under **General**)

Wetlands International Specialist Group Co-ordinators
c/o Wetlands International (see under **General**)
http://www.wetlands.org/networks/SGroups.htm

BirdLife International (see under **General**)

Emergency situations

No specific addresses. See under **General**, according to circumstances.

Site inventories

MedWet Coordination Unit
Villa Kazouli, Kifissias & Gr. Lambraki 1
14561 Kifissia
Greece
Tel.: +30-210-8089270
Fax: +30-210-8089274
E-mail: info@medwet.org
WWW: www.medwet.org

Ramsar Convention Bureau (see under **General**)

Site management

EUROSITE - European Network of Site Management Organizations
PO Box 1366
5004 BJ Tilburg
The Netherlands
Tel.: +31-13-4678638
Fax: +31-13-4634129
E-mail: eurosite@kub.nl
WWW: www.eurosite-nature.org

Ramsar Convention Bureau (see under **General**)

Sustainable harvest

International Council for Game and Wildlife Conservation (C. I. C) (see under **General**)

FACE - Fédération des Associations de chasseurs de l'EU
82 Rue F. Pelletier
B-1030 Brussels
Belgium
Tel: +32-2-732.69.00
Fax: +32-2-7327072
E-mail: face.europe@infoboard.be
WWW: http://www.face-europe.org/

Trade

TRAFFIC International
219c Huntingdon Road
Cambridge CB3 0DL
UK
Tel: (44) 1223 277427
Fax: (44) 1223 277237
E-mail: traffic@WCMC.org.uk

TRAFFIC Europe
Waterloosteenweg 608
1060 Brussels
Belgium
Tel.: +32-2-3470111
Fax: +32-2-3440511
WWW: www.traffic.org

UNEP/CITES Secretariat (Convention on International Trade of Endangered Species, Washington Convention)
PO Box 456
Geneva Executive Centre
1219 Châtelaine (Geneva)
Switzerland
Tel.: +41-22-9799139 and 9799140
Fax: +41-22-7973417
E-mail addresses: http://www.cites.org/eng/disc/sec/index.shtml
WWW: http://www.cites.org/

Ecotourism

The Ecotourism Society TES
PO Box 755
North Bennington
VT 05257
USA
Tel: +1-802-447-2121
Fax: +1-802-447-2122
E-mail: ecomail@ecotourism.org
WWW: http://www.ecotourism.org

Bird damage

FAO - Food and Agriculture Organization
Forest Resources Division
Viale delle Terme di Caracalla
00100 Rome
Italy
Tel.: +39-06-57053589
Fax: +39-06-57055137
WWW: www.fao.org/fo

IBSC - International Bird Strike Committee
C/o National Bird Strike Committee
Royal Netherlands Airforce Airstaff
P.O.Box 20703
2500 EB The Hague
The Netherlands

Tel: +31-70-3396911

Waterbird Monitoring

International Waterbird Census (IWC) & African Waterbird Census (AfWC)
Waterbird Conservation Officer
c/o Wetlands International (see under **General**)

SOVON
Rijksstraatweg 178
6573 Beek-Ubbergen
The Netherlands
Tel: 024 684 81 11
Fax: 024 684 81 88
WWW: http://www.sovon.nl/

The Wildfowl & Wetlands Trust
Slimbridge
Gloucester
GL2 7BT
UK
Tel: +44 1453 890333
Fax: +44 1453 890827
E-mail addresses: http://www.wwt.org.uk/contact/
WWW: http://www.wwt.org.uk/

British Trust for Ornithology
The Nunnery
Nunnery Place
Thetford
Norfolk
IP24 2PU
UK
Tel: +44-1842-750050
Fax: +44-1842-750030
E-mail: info@bto.org
WWW: http://www.bto.org/

The Avian Demography Unit
Department of Statistical Sciences
University of Cape Town
Rondebosch 7701
South Africa
Tel: +27 (021) 650 3219
Fax: +27 (021) 650 7578
E-mail addresses: http://web.uct.ac.za/depts/stats/adu/staff/p_staff.htm
WWW. http://www.uct.ac.za/depts/stats/adu/

The European Bird Census Council
WWW: http://zeus.nyf.hu/~szept/ebcc.htm

Training facilities

Within the AEWA region, there are many facilities for training at different levels, ranging from three-day courses on various environmental topics for people with no prior knowledge, to Ph.D. level at universities. Many universities and institutes offer courses of varying lengths on wildlife management, site management, wetland ecology, sustainable development, ecotourism development, and many other related topics. UNEP maintains a database listing hundreds of courses. The Ramsar Convention Bureau maintains a list of environmental courses specifically aimed at wetland management. For information contact:

UNEP Directory on Environmental Education and Training Opportunities worldwide:
http://www.unep.org/unep/products/publicat/education/index.htm

The Ramsar Convention Bureau
Rue Mauverney 28, CH-1196 Gland, Switzerland
Tel: +41-22-999-0170; fax: +41-22-999-0169
E-mail: ramsar@ramsar.org
WWW: http://www.ramsar.org

There are several schools in Africa that specifically offer education in wildlife management and site management. These are attended by wardens and reserve managers from all over the continent. The most important are:

Ecole de Faune de Garoua
B.P. 271, Garoua, Cameroun
Tel/fax: +237-273135

College of African Wildlife Management
Mweka, P.O. Box 3031, Moshi, Tanzania
Tel/fax: +255-55-51113
E-mail: ulgtan@eoltz.com
WWW: http://www.mwekawildlife.org/

Kenya Wildlife Training Institute
P.O. Box 842, Naivasha, Kenya
Tel: +254-0311-20267/21329
Fax: +254-0311-20577
E-mail: kwsti@users.africaonline.co.ke

Southern African Wildlife College
Private Bag X3015, Hoedspruit, 1380, South Africa
Tel/fax: +27-15-7932621
E-mail: sawc@iafrica.com
WWW: http://www.wildlifecollege.org.za/

Special wetland courses for managers from developing countries and countries with economies in transition are given by the Wetland Advisory and Training Centre (WATC) of the Institute for Inland Water Management and Waste Water Treatment (RIZA) of the Netherlands Ministry of Transport, Public Works and Water Management. For information contact:

WATC
P.O. Box 17, 8200 AA Lelystad, The Netherlands
Tel: +31-320-298346; fax: +31-320-298339
E-mail: watc@riza.rws.minvenw.nl

IUCN also regularly organises short courses on wetland management at different levels, both for managers with little prior education and for decision makers at higher levels. These courses are given in the region (*e.g.* in West Africa). For information contact:

IUCN
Rue Mauverney 28, CH-1196 Gland, Switzerland
Tel: +41-22-999-0001; fax: +41-22-999-0002

Appendix II

GLOBALLY THREATENED MIGRATORY WATERBIRD SPECIES IN AEWA RANGE STATES

The occurrence of globally threatened species of migratory waterbirds in AEWA Range States, based on BirdLife International 2000 *Threatened Birds of the World,* the official source for birds in the *2000 IUCN Red List of Threatened Species*. Breeding species are indicated with a 'B'; species occurring only as passage migrants and winter visitors are indicated with a 'W'. No attempt has been made to indicate relative numbers, and in some instances, the numbers of birds involved may be very small. Codes followed by an asterisk * mark species not included in *Threatened Birds of the World* but known nevertheless to occur in the country.

	Slaty Egret	Waldrapp	White-headed Duck	Lesser White-fronted Goose	Red-breasted Goose	Marbled Teal	Siberian Crane	Blue Crane	Wattled Crane	Sociable Lapwing	Slender-billed Curlew	Total Number of species
Algeria			B			B					W	3
Armenia						B						1
Azerbaijan			W	W	W	B						4
Botswana	B								B			2
Bulgaria			W	W	W						W	4
Chad						W						1
Democratic Republic of Congo	B								B			
Eritrea										W		1
Estonia				W								1
Ethiopia									B			1
Finland				B								1
Greece			W	W	W						W	4
Hungary				W	W						W	3
Iran			B			B	W			W		4
Iraq			W			B				W		3
Israel			W			W				W		3
Italy											W	1
Jordan						W						1
Kazakhstan			B	W	W	B				B	W	6
Lithuania				W								1
Malawi									B			1
Mali						W						1
Morocco		B				B					W	3
Mozambique	B								B			2
Namibia	B							B	B			1
Netherlands					W							1
Nigeria						W						1
Norway				B								1
Oman										W		1
Poland				W								1
Romania			W	W	W						W	4

Russia			B	B	B	B	B			B	B	7
Saudi Arabia										W		1
Senegal						W						1
	Slaty Egret	Waldrapp	White-headed Duck	Lesser White-fronted Goose	Red-breasted Goose	Marbled Teal	Siberian Crane	Blue Crane	Wattled Crane	Sociable Lapwing	Slender-billed Curlew	Total Number of species
South Africa	B							B	B			3
Spain			B			B						2
Swaziland								B				1
Sweden				B								1
Syria		B	W			W				W		4
Tunisia			B			B					W	3
Turkey			B	W		B				W	W	5
Turkmenistan			B	W*		B				W		4
Ukraine				W*	W						W	3
Uzbekistan			B	W*		B				W	W*	4
Serbia & Montenegro											W	1
Zambia	B								B			2
Zimbabwe	B								B			2

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