

Waterbird and site monitoring along the Atlantic coast of Africa



Strategy and manual



Waterbird and site monitoring along the Atlantic coast of Africa: strategy and manual

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Eurasian Oystercatcher, specialist forager on shellfish.

PHOTO: Arnold Meijer / Blue Robin

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Flock of Dunlin and Red Knot moving to a high-tide roost.

Photo: Arnold Meijer / Blue Robin

Foreword

My first waterbird counts were in the Tagus estuary, Portugal in 1977. We were 6 or 7 enthusiastic young lads led by an English ornithologist. I was 18 years old and like the rest of us I didn't believe counting flocks of waders was possible! In those times the annual winter bird counts were organised by the International Waterfowl Research Bureau (IWRB).

Few of the members of this pre-historic counting team followed an ornithological career but they're all fond of birds and they all plead for the cause of conservation. Bird counts were a key factor to reset modern ornithology in Portugal. Tony Prater came back the year after to carry on counts and train a local team of youngsters in wader counting and research. Setting up a national ringing scheme just followed under the auspices of the Ministry of the Environment, and the first breeding bird atlas was published in 1989. A few years later a private society for the conservation of birds emerged and became the national representative of Birdlife International in Portugal (SPEA - Sociedade Portuguesa para o Estudo das Aves).

The organisation of bird counts will improve public awareness and care for birds and biodiversity in general. However, knowing bird numbers is also important to evaluate population trends and improve knowledge on the phenology of bird migration. Waterbird censuses are valuable to identify key stop-over sites during migration and wintering hot spots. The number of birds visiting a wetland is a good indicator to assert its ecological importance, and International classification criteria are often based on that measure. Without having detailed information on bird numbers at a site it will never be eligible for the Ramsar convention for instance.

Nevertheless, the usefulness and consistency of the results obtained doing bird census depends on the level of expertise of the observers and the respect of methodologies well established internationally. We are dealing with estimates but the accuracy of the counts is important to support reliable decision making, concerning bird populations and site management at local and global levels all along the flyways.

We all agree that, without good basic training, material and perseverance, bird monitoring will be less effective. Marathon runners cannot win without training regularly and good training shoes. Likewise training, telescopes, binoculars and bird-guides are needed to keep counters in shape. Last weekend I was on the beach observing migrant spoonbills heading north along the shore line close to Nouakchott, Mauritania and when I saw the groups coming my first instinct was to count them! I'm no longer a bird counter like I used to be but I keep binoculars at close range to keep in shape and to be sure not to induce in error the ones trusting my counts.

The present manual is especially dedicated to bird count coordinators and field ornithologists operating along the western seaboard of Africa. It provides useful and comprehensive information, sensible enough to ease the establishment of monitoring strategies and bird count networks. It will help newcomers understanding what waterbird counts are all about, and why they are important. Its scope goes far beyond a simple bird count manual and I am sure it will represent an important contribution to further establish effective waterbird monitoring in the region. Enjoy it and keep counting!

Antonio Araujo

Manager, West Africa Programme, MAVA Foundation

Member of the advisory board of the Wadden Sea Flyway Initiative



Roosting waders (Grey Plover, Common Ringed Plover), Common Tern and Grey-headed Gull.

PHOTO Dave Montreuil

Summary

The wetlands of the Atlantic coast of Western Africa are of utmost importance for waterbird populations, other biodiversity and people alike. For proper policy and management of these resources monitoring is an important tool. It helps in providing an early warning of negative developments and provides evaluation of taken measurements. Countries in the region require monitoring data as the basis of site management decisions, national conservation strategies and international obligations. This document provides both a strategy on the collection of monitoring data, concentrating on numbers of waterbirds and the environmental conditions of their sites, and provides a practical manual showing how to carry out this monitoring, both for coordinators and fieldworkers. Waterbirds are relatively easy to quantify and they are sensitive to the quality of their environment. This makes them important indicators of the ecological quality of the sites they use.

This document is developed in the framework of the Conservation of Migratory Birds project and the Wadden Sea Flyway Initiative. A cooperation between BirdLife International, Wetlands International, several organizations involved in the monitoring and conservation of the Wadden Sea and stakeholders in Western Africa, both government and non-government. It results from a workshop in Dakar in June 2012 and builds on the methods of the International Waterbird Census and the Important Bird Areas Programmes.

The monitoring strategy consists of:

- Counts of non breeding Waterbirds:
 - at a selected sample of sites or sub-sites to provide the basis of population trend analysis - every year in January;
 - at as many sites as possible ('Total Count') to provide the basis of waterbird population estimates - every six years as a minimum in January;
 - in other months of the year to gain an understanding of seasonal variations and importance in other months- in months with peak numbers, sometimes every month, July as a priority if possible.
- Counts of breeding Waterbirds
 - Complete survey of all colonies - every three - six years;
 - Selected sample of sites - every year;
- Registration of environmental conditions, threats and conservation measures at sites -during every visit.

The manual gives information for coordinators about how to make a site inventory, how to organize an observer network, how to organize the field work, what to provide to observers including maps with boundaries of sites and counting units, how to compile the data and use them for national purposes and submit them for international use. It gives information for field observers on how to count waterbirds, which equipment to use and how to submit the data. For the monitoring of environmental conditions, threats and conservation measures detailed guidelines are given on how to score these following IBA guidelines.

It is hoped that this strategy and manual will help in the further conservation and sustainable use of the coastal wetlands of Western Africa. For this, cooperation along the whole flyway and within the region will be important. Success will be dependent on funds becoming available from within and outside the region enabling training of field workers and the carrying out of the necessary monitoring activities and analyses of the data.

Acknowledgements

This document results from a fruitful cooperation between the Conservation of Migratory Birds project and the Wadden Sea Flyway Initiative. In June 2012 a workshop was organized in Dakar, Senegal involving National Coordinators from the region and many other stakeholders. During this workshop the monitoring strategy for the region was developed and in the months after the workshop a draft of the manual was prepared. Both strategy and manual were tested during the counts in January 2013 and January 2014 adding to the further development.

The MAVA foundation (Switzerland), Vogelbescherming the Netherlands, the Ministry of Economic Affairs, the Netherlands through the Programme Rich Wadden Sea and the Ministry of Environment, Nature Conservation and Nuclear Safety, Germany, are thanked for providing funding for the Conservation of Migratory Birds project and the Wadden Sea Flyway Initiative making the development of this monitoring strategy and manual possible.

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We thank them all.



Whimbrel, specialist feeder on crustaceans.

1. Introduction

1.1 Background and aims of this document

Background

- The wetlands of the coastal zone of Western Africa are among the world's natural wonders and are of utmost importance for waterbird populations, other biodiversity and human beings alike. Countries in the region require monitoring data about these sites as the basis of site management decisions, national conservation strategies and international obligations.
- BirdLife International's Important Bird and Biodiversity Areas (IBA) programme (Fishpool & Evans 2001) collect monitoring data on the state of bird populations and environmental conditions and pressures at site level. In principal this programme can provide a lot of the monitoring information required but it is in need of consolidation and expansion in the region.

- The International Waterbird Census (IWC) programme as coordinated by Wetlands International (Delany *et al.* 1999) collect monitoring data on waterbirds during simultaneous counts at many sites and countries during especially January when many northern migrants are present. Also this programme needs expansion and improvement in the region, although good information has been collected in the past already (for instance Diagana & Dodman 2006, 2007, Altenburg *et al.* 1982, Triplet & Yesou 1998, Schepers *et al.* 1998, Trollet & Fouget 2004, van der Winden *et al.* 2007, Zwarts 1988).
- The Wadden Sea Flyway Initiative (WSFI) aims, among others, to promote and enhance Integrated monitoring along the whole coastal East Atlantic Flyway for especially migratory populations (van Roomen *et al.* 2013). This initiative seeks to address priority gaps in monitoring. The Atlantic coast of Africa is such a gap within the East Atlantic Flyway.



Great White Pelicans, Pink-backed Pelicans and Gull-billed Terns.

- The Conservation of Migratory Birds (CMB) project aims for local partner development and strong government - non-government cooperation in West African countries for the benefit for better conservation of migratory birds. Improving monitoring is one of the tools towards this aim.

Aims & objectives

- The purpose of this monitoring strategy and manual is to improve the level of information for conservation and management through intensified, expanded and harmonized monitoring of waterbird species and their sites using IBA and IWC methodology.
- The IWC Programme will provide data on waterbird numbers, distribution and population trends at different spatial scales.
- The IBA Programme will provide data on the state of wetland sites (in addition to bird numbers, also the state of the habitat itself), the pressures which threaten them, and data on conservation responses taken at the sites.
- Through continuing monitoring by IWC and IBA methodologies, priorities for management and conservation actions can be decided and the effectiveness of measures taken can be assessed. This monitoring will provide a basis for more effective management and conservation of the waterbirds and wetlands of the Atlantic coast of Africa.
- By using these data, together with data from other sites along the East Atlantic Flyway in Europe, information can be summarized at different spatial scales and the conservation status of waterbirds at flyway level can be assessed.

1.2 How to use this document

- This document is aimed for coordinators and field workers (or aspirant coordinators and fieldworkers) involved in waterbird and site monitoring in the region.
- After a short assessment of the state of monitoring in the region (chapter 2), most attention is given to the future strategy for waterbird and site monitoring (chapter 3) and the manual how to carry out this monitoring (chapter 4).

1.3 Definitions used in this document

Atlantic coast of Africa

All countries from Africa bordering the Atlantic Ocean from Morocco to South Africa. They are part of the East Atlantic Flyway.

Coastal zone

This includes in principal sites under tidal influence or within 30 km of the coasts. Sites further from the sea that are part of wetland complexes affected by tidal processes will also be included.

Site

Sites are biologically different in character or habitat from the surrounding land (or deeper open sea) and provides all the requirements of the birds during the time they are present. For many wetlands this definition is easy as a wetland often stands out against the surrounding habitat. However when the wetland habitat is very large and continuous it becomes much more difficult to define separate sites. In that case arbitrary decisions need sometimes to be made. It is best to follow the boundaries of already protected or potentially protected sites (including their buffer zones) as Ramsar sites, National Parks and Important Bird Areas. Where such protected sites do not exist or are overlooked or are not defined yet it is best to use logical geographical units (often also corresponding with (local) geographical names).

Counting unit

Sites are often subdivided in counting units to organize the counting of the site in a well organized way and to describe distribution of waterbirds within a site. It enables to organize the count among different observers to perform the count in a simultaneous way. A counting unit is a part of the total site which can be counted more or less completely by one or a small group of observers in 2-4 hours.

Sub-site or monitoring site

Large sites are often too big to count annually for monitoring purposes. In that case it is best to select a logical part of a site for this annual monitoring. It could be one counting unit or a combination of counting units. It is important that the birds in this sub-site/monitoring site act more or less separately from other (groups) of birds at other parts of the site and that the sub-site/monitoring site gives a good sample

of the species and the numbers occurring at the total site.

Non-breeding waterbirds

This term refers to waterbirds outside the breeding phase of their life-cycle. It includes intra-African migrant and non-migratory waterbird species as well as those which breed in the arctic, boreal, temperate and Mediterranean regions and migrate to Africa after the breeding season each year, returning north to breed the following year. This strategy and manual focusses especially on species which congregate at specific wetland sites in the non-breeding season.

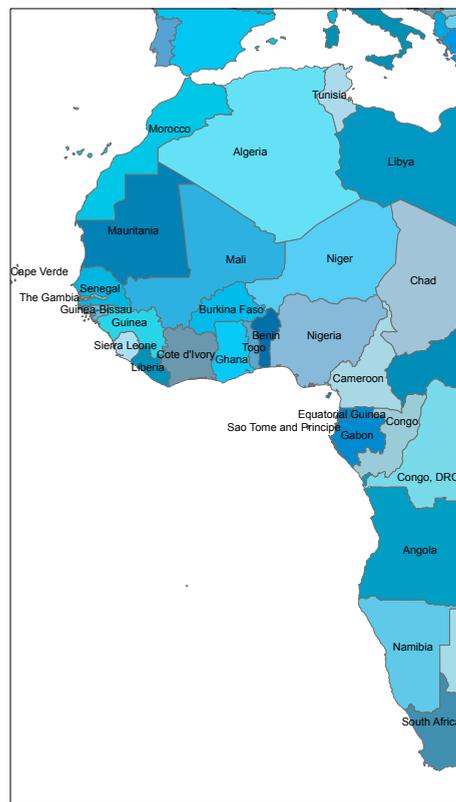
Breeding waterbirds

Wetland sites are also important for breeding waterbirds. Especially species which congregate to breed in colonies offer good possibilities for monitoring and represent important wetland values. In the Atlantic zone of Africa the following families include species with a tendency to breed colonially: Pelicans, Cormorants, Herons, Egrets, Storks, Ibises, Spoon-

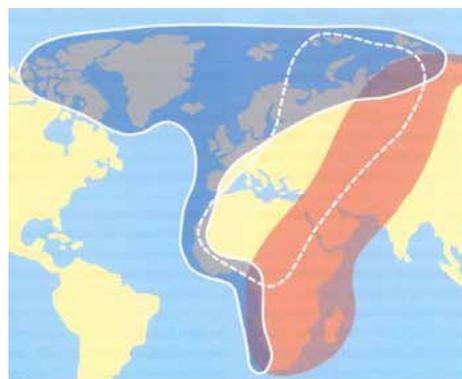
bills, Flamingos, Gulls and Terns. Also certain seabird families (Petrels, Tropicbirds, Boobies and Frigatebirds) breed in colonies in the West African coastal zone and should be included in the monitoring. This strategy and manual gives some information on the monitoring of breeding birds, but mostly it will point to other publications where it is treated more extensively.

Environmental conditions

Environmental conditions are defined as (a) the (a)biotic characteristics of sites, (b) the environmental and/or anthropogenic pressures on sites and (c) the conservation measures at sites. By following these conditions over the years monitoring of these conditions becomes possible.



B. Western half of Africa with the countries bordering the Atlantic Ocean



A. East Atlantic Flyway, shown in blue

Figure 1. The region covered by the Strategy showing (A) the East Atlantic flyway and (B) the countries in Africa bordering the Atlantic ocean

2. State of Monitoring in the region

2.1 Why monitoring

2.1.1 National policies and international obligations

- Coordinated monitoring of wetland sites and waterbirds at national level contributes strongly to effective national level conservation and protection measures and nature conservation legislation. This contributes to National Biodiversity Strategies and Action Plans that follow from them.
- A synthesis of results from all sites will underpin national site conservation priorities and policies and will allow the effectiveness of such policies to be measured.
- All countries that sign up to the Multilateral Environmental Agreements and other forms of international cooperation (see table 1) such as the Abidjan Convention (focussing on the Atlantic coast of Africa), Convention on Biological Diversity (CBD), Ramsar Convention on Wetlands, and the African Eurasian Migratory Waterbird Agreement (AEWA) embrace, internationally agreed standards for biodiversity management in their countries. The implementation of many resolutions and action plans included in these instruments calls for proper national-level monitoring. National reports, mostly at a three-yearly intervals, need to be prepared, giving data on the status of biodiversity and level of protection of sites.
- One of the important criteria for the selection of key sites of national and international levels of significance is the so called 1% threshold developed under the Ramsar convention. This represents 1% of the estimated population size of a particular flyway or biogeographic population. These population sizes can only be estimated accurately and updated after coordinated and simultaneous

counts of as many as possible of the sites used by a particular species and population at a given season.

- At the international level, information on total population sizes and trends are very important for assessment of conservation priorities globally, including the African-Eurasian region. They are used in the IUCN Red List of Threatened Species, in the Wetlands International Conservation status report for AEWA, and in the Waterbird Population Estimates report for the Ramsar Convention. Within AEWA, the number of populations for which good quality data are available to allow accurate assessment of conservation status is still small.



Greater Flamingo. Large numbers occur at West African coastal wetlands.

Table 1. Ratification (Y=yes, N=no) by countries included in this Strategy of the Convention on Biological Diversity, African-Eurasian Migratory Waterbird Agreement (AEWA), the Convention on Wetlands (Ramsar) and the Abidjan Convention (situation December 2014). Countries listed from North to South along the flyway.

	CBD	AEWA	Ramsar	Abidjan
Morocco	Y	Y	Y	N
Mauritania	Y	Y	Y	Y
Senegal	Y	Y	Y	Y
Cape Verde	Y	N	Y	N
The Gambia	Y	Y	Y	Y
Guinea-Bissau	Y	Y	Y	Y
Guinea	Y	Y	Y	Y
Sierra Leone	Y	N	Y	Y
Liberia	Y	N	Y	Y
Ivory Coast	Y	Y	Y	Y
Ghana	Y	Y	Y	Y
Togo	Y	Y	Y	Y
Benin	Y	Y	Y	Y
Nigeria	Y	Y	Y	Y
Cameroun	Y	N	Y	Y
Equatorial Guinea	Y	Y	Y	N
São Tomé and Príncipe	Y	N	Y	N
Gabon	Y	Y	Y	Y
Congo	Y	Y	Y	Y
DR Congo	Y	N	Y	Y
Angola	Y	N	N	N
Namibia	Y	N	Y	N
South Africa	Y	Y	Y	Y

2.1.2 Site-level conservation and management

- Effective site management requires monitoring of the important biodiversity present, of possible threats to the conservation status of the site and its species, and of conservation and management measures undertaken.
- By monitoring, (meaning repeated, standardised measurements over time), changes

in conservation status can be detected and effectiveness of measures taken can be assessed.

- This monitoring can be used as the basis for adaptive management, which allows management priorities to be decided and appropriate conservation policies to be established, according to the situation and the need at a particular time.
- An important tool for site managers is the

trend in numbers of international populations of each species. It gives information on the overall conservation status of populations across all the sites they use. By comparing population trends at the site or national level with these international level trends, assessment of how the conservation status of all the species at a site, or all the sites in a country, are doing in comparison with the international trend becomes possible. Information on bigger increases or decreases at site level in comparison with the international trend can provide better insight into the possible causes behind these trends. These international trends can only be estimated by repeated counts at a representative selection of sites across their range.

- Data on waterbird numbers and trends can also be used as indicators, both related to abiotic and biotic factors or factors related to human use. As such, waterbird monitoring is a very cost effective way to follow developments of many other different factors related to management and conservation.

2.2 Current state of monitoring in the region

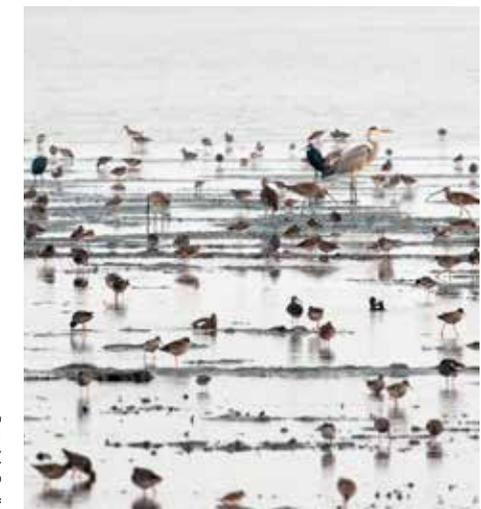
- The historical and current extent of the participation of each country in the IWC and IBA

monitoring schemes can be found in table 2. Despite differences between countries, considerable efforts have already been made. For the IBA programme, monitoring is currently only carried out in countries with a national BirdLife partner organisation.

- A number of the important sites in the region have been visited by expeditions from Europe in cooperation with local partners. Counts of non-breeding birds derived in this way give important information on total numbers but are not carried on a regular basis and different key sites have not been counted in the same years, which make the interpretation of results more difficult.
- Over the years, sometimes different site definitions have been used and uncertainty exists about the completeness of counts. This makes assessment of numbers in important sites and comparison of numbers over the years (monitoring) difficult.
- For most breeding birds no long term monitoring is carried out in the region yet. However for several colony breeding species in West Africa, data of important sites have been summarized and more and more attention is given to simultaneous counts and assessment of reproduction (Veen *et al.* 2007).



Doing fieldwork: counting birds.



Mixed group of waders and herons on emerging mudflat.

Table 2. Duration and level of participation of countries of the Atlantic coast of Africa in the IWC and IBA monitoring programmes (situation December 2014). Number of IBAs refers to coastal wetland sites only. Countries listed from North to South along the flyway.

	First IWC counts in database	Most recent IWC counts in Database	No. of years IWC data	No. of IBAs (Fishpool & Evans 2001)	Participating in IBA monitoring
Morocco	1968	2013	33	20	Yes
Mauritania	1972	2014	29	5	No
Senegal	1958	2014	44	14	No
Cape Verde	2006	2006	1	1	No
The Gambia	1998	2014	8	5	No
Guinea-Bissau	1987	2014	7	7	No
Guinea	1999	2014	11	5	No
Sierra Leone	1992	2014	13	2	Yes
Liberia	2005	2014	2	1	Yes
Ivory Coast	1991	2014	15	1	No
Ghana	1996	2014	10	6	No
Togo	1999	2014	8	0	-
Benin	1996	2014	13	2	No
Nigeria	1999	2014	8	1	Yes
Cameroon	1984	2014	20	0	-
Equatorial Guinea	-	-	0	1	No
São Tomé and Príncipe	-	-	0	1	Yes
Gabon	1992	2014	10	3	No
Congo	1997	2014	5	0	-
DR Congo	2001	2014	6	0	-
Angola	1999	2014	3	2	No
Namibia	1976	2014	32	11	Yes
South Africa	1992	2013	22	14	Yes

2.3 Current state of capacity in the region

Over the years a growing capacity in capabilities for monitoring is present in the region. In most countries National coordinators are present working with skilled field workers to carry out counts. Besides governmental institutions, more and more NGO's are involved as well.

On the other hand, resources are scarce and number of skilled field workers are often not more than five-ten per country working with relatively few equipment. Also turn-over in persons is relatively high making long-term improvements more difficult and continued training important.

In general, more capacity is needed in the set-up of monitoring programmes, storage



White-faced Whistling-ducks, common in the freshwater wetlands and rice fields.

of data and the usage of this data for national policy and management.

a kick start for a monitoring project of colony breeders in the region.

2.4 Conclusions and recommendations

The IBA and IWC programmes provide an excellent framework for monitoring wetlands in the Western African coastal zone. However their implementation to date has been insufficiently regular and complete.

An improvement in the frequency and rigour of work under these existing programmes, achievable through a programme of capacity development and international cooperation, will allow much improved monitoring as a basis for conservation and management activities at local, national and international levels.

The monitoring of breeding birds is in its early stage but activities through the Alcyon Project, coordinated by BirdLife International and MAVA funded, on seabirds of the West African coastal zone, including survey of colonies of terns and gulls, could provide

Detailed communication and finance strategies are needed to ensure that monitoring can be extended and continued into the future as contributions to the continued management and conservation of West African coastal wetlands and its species.

3. The monitoring strategy

3.1 Cooperation between existing programmes

- The waterbird monitoring strategy derives from existing projects and programmes in the region and will add value to their outputs.
- Development of the internationally coordinated, but nationally focussed IWC and IBA programmes, as coordinated by Wetlands International en BirdLife International, will provide a solid information base for the management and conservation of wetlands and waterbirds at national level, while contributing to the international obligations of each country.
- The implementation of the monitoring strategy will depend on strong commitment by both government and non-governmental organizations in the region and good collaboration between them.

- The implementation of the monitoring strategy will also be carried out in cooperation with the Wadden Sea Flyway Initiative, African Initiative as coordinated by AEWA and other appropriate projects and programmes.
- The timing of monitoring activities will be harmonized with the need for monitoring data on site, national and international level to enable the best use of this knowledge. See table 3 for an overview of international reporting cycles. It needs to be realized that the field work to be used for such reporting should be finished much earlier to allow for database storage, analyses and technical reporting of the field data. It is advised that periodic assessments of the results of the monitoring will be ready to be used together for both the Ramsar Convention and AEWA Agreement.

Table 3. Long-term timeline of output including waterbird monitoring data for international conservation initiatives. WPE is the global Waterbird Population Estimates in the framework of the Ramsar convention, CSR is the Conservation Status report of waterbirds in the framework of the AEWA agreement.

Instrument	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Ramsar			WPE6			WPE7			WPE8			WPE9
AEWA		CSR6			CSR7			CSR8			CSR9	



Group of waders foraging on the last available mudflats before disappearing into the mangroves to roost.



Soft mudflats can make counting difficult.

Figure 2. Counting of sites (1-4) with a varying frequency. In January all sites are counted giving the possibility of adding the results together (something which is advisable for July as well). The counts in the other months give additional information on seasonal patterns and maximum numbers of birds using the site.

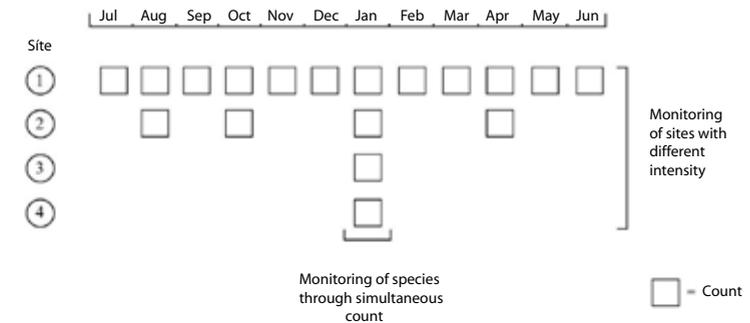
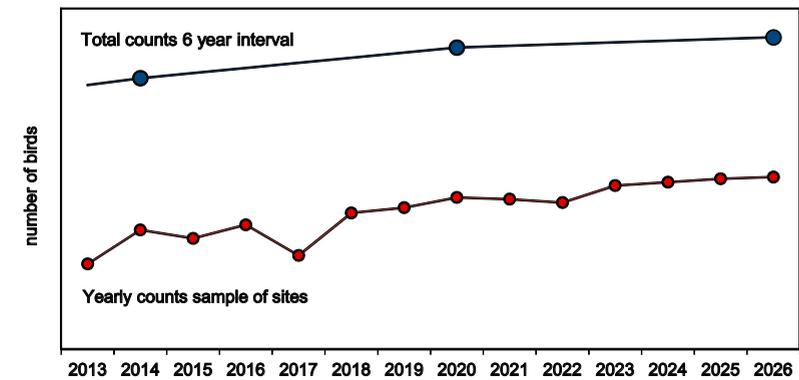


Figure 3. Comparison of theoretical results based on a yearly and six yearly counting programme. The depicted timing of total counts is also theoretical, the exact timing will be decided with stakeholders involved.



3.2 Non-breeding waterbirds

- Monitoring of waterbirds in the non-breeding season will involve two approaches (a. and b. below) using similar methodology:
 - Yearly counts at a sample of relatively small and accessible set of sites (or sub-sites/monitoring units within large sites) to provide the basis of waterbird population trends. Priority month for counts is January. If possible some of these sites can also be counted more frequently during the season to get data on seasonal patterns and on site-specific seasonal maxima, while for intra- African migrant and resident species, July is an important month for additional visits. See Figure 2 for an example of a counting scheme with varying intensity.
 - Total counts at a minimum frequency of every six years in January at as many sites as possible, including all the most important ones and the ones counted under a. The results of this total count will give information on total bird numbers in the region, and information on key sites which cannot be counted in the yearly programme. It will also be possible to use data from these counts to validate trend estimates from the yearly counts. See figure 3 of a hypothetical result based on the combined data from the a. and b. approach.

3.3 Breeding waterbirds

- While counting total numbers present at a site is often possible for many non-breeding waterbirds, this is often not the case for breeding waterbirds because of their dispersed and hidden behaviour. However an exception are species breeding in colonies.
- As with non-breeding waterbirds, it is recommended that once every six years as a minimum a total count is organized of colony breeding species in the region.
- It should be investigated if and on which scale yearly counts of a subset of colonies is possible for monitoring purposes.

3.4 Environmental conditions

- Data on (a)biotic site conditions, human pressures and conservation measures will be collected by using the standards as developed under the BirdLife's IBA programme as a basis (BirdLife International 2006).

- Information about the pressures and responses at sites will be collected during IWC monitoring visits, where feasible. Also during visits to record breeding birds and other (monitoring) visits, registration of pressures and responses using the same methodology will be important.

3.5 Capacity development

- This strategy will succeed when national and local institutions and organizations are committed to monitoring as part of their working tasks and have agreed on a common programme. For this it will be important that the monitoring will be beneficial for national and local policy and management.
- The strategy will succeed when enough individuals have acquired the necessary coordination, fieldwork and data-handling skills and are collecting, exchanging and using data in agreed ways.
- Much training material is already available to



PHOTO Dave Montreuil

Royal Terns in their breeding colony. West African wetlands are also important for breeding.



PHOTO Bernd de Bruijn

Registration of human activities is an important part of the monitoring strategy as well as counting the birds.

train national and local policy officers, coordinators and observers (Dodman & Boere 2010, Hecker 2012). After potential organizations and individuals have been identified, approached and engaged, the next step will be to train them and involve them in further implementation of the strategy.

- Monitoring demands repeated effort over the long term and this strategy should be the springboard for a permanent, long-term programme. The project coordinators should devote enough time to planning the future of the work, developing the relationships with partners and donors and raising the funds necessary for further implementation of the strategy.

3.6 Implementation of this Strategy

- The IWC and IBA programmes are long running initiatives carried out with several sources of funding and these will be continued and provide in many ways the basic infrastructure for the implementation of this strategy.
- After the first project period of WSFI and CMB until 2014 it is expected that new project periods will be agreed upon including implementation of this monitoring strategy. Attention will be focused on capacity building, funding of field work and joint analyses and reporting.
- It will also be important that governments in the region will support the programme of work in each country. This for national policy and implementation of international obligations.



PHOTO Barend van Germerden

For counting waterbirds binoculars and a telescope are needed, and sometimes also a camera to confirm observations.

4. Monitoring Manual

4.1 The team

- Figure 4. illustrates the cooperation between coordinators and field workers in waterbird and wetland monitoring. International level coordinators liaise with coordinators at the national level. National coordinators organize and facilitate the cooperation with the individual observers. In many countries, a number of intermediate coordinators organize observations in particular geographic regions or at large, complex sites covered by teams of counters (site coordinators).
- This team of involved and dedicated persons make the monitoring work. They should

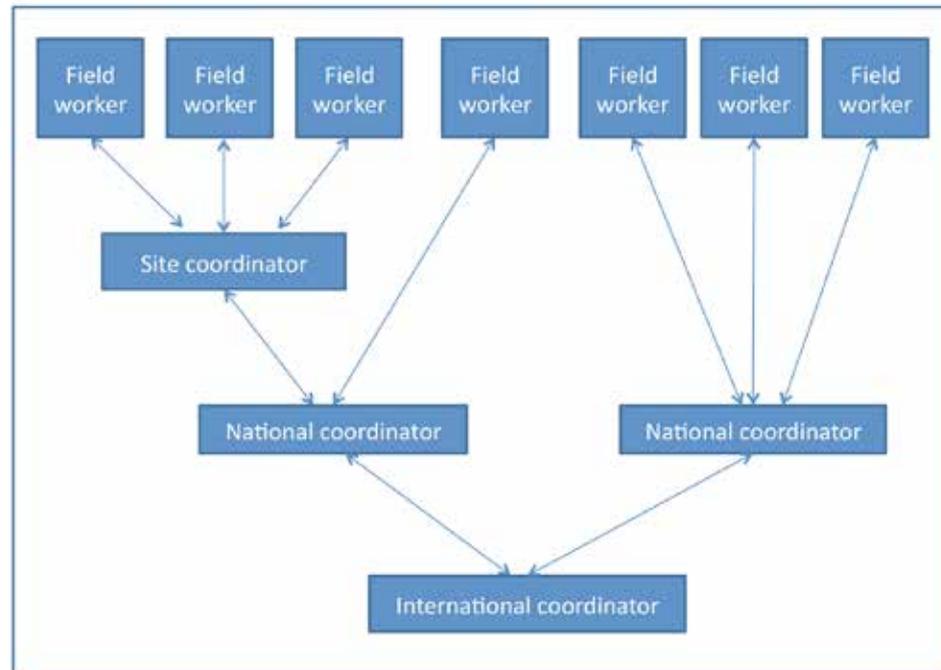
cooperate and communicate and fulfil the different roles. Without field workers there is no data to report, without coordination there is no agreed counting dates and no summarizing reporting of results.

4.2 National Coordination

4.2.1 Rewards and tasks of being national coordinator

- **Rewards of being a national coordinator**
 - As a national coordinator you are able to summarize the importance of your country for waterbirds and their sites.

Figure 4. The relation between different practitioners in waterbird and wetland monitoring ("the team"). FW are field workers.



- As a national coordinator you have a key position within the network of stakeholders for waterbird and wetland policy, management and research.
- You will have many contacts with all parts of the country and will be very well informed about local developments.
- Being a national coordinator gives you (and the organization you work for) a good position in giving advice on conservation and management at national level.

■ Profile of a national coordinator

- A national coordinator needs good project management skills, good networking skills and an understanding of the actual and potential importance of the data collected for the conservation and management of waterbirds and their habitats.
- The national coordinator is responsible for monitoring throughout the whole country and should be able to cooperate with different stakeholders and build strong cooperation networks.
- A national coordinator needs the social, political and economic awareness necessary for maintaining the enthusiasm of a network of observers, working with both governmental and non-governmental organizations, and raising and allocating funds.
- The national coordinator should also have good ornithological knowledge about the waterbird species found in their country and having extensive experience with counting, waterbird monitoring and threats and environmental monitoring. From this it will be possible to give advice and motivate site coordinators and field workers and help to raise quality and consistency of the data.
- National coordinators should have the technical skills to comfortably compile and manage data from observers (spreadsheets, database, GIS) or organize this within a small group of closely cooperating officers. Minimizing mistakes in the collected data and accuracy and attention to detail are vital.
- It is most efficient if the same person in a country organizes both waterbird monitoring under the International Waterbird Census programme (IWC, coordinated by Wetlands International) and site monitoring at these wetlands under the Important Bird Areas programme (IBA, coordinated

by BirdLife International). Where this is not possible, it is essential that the coordinators of each scheme cooperate closely to minimize duplication of effort both in the field and in the office.

■ Key tasks of a national coordinator

- The key tasks of a national coordinator for monitoring waterbirds and their sites can be summarized as:
 - Mobilizing and maintaining resources for monitoring in a country;
 - Maintaining a site inventory with documentation of site names, site codes and site maps. Also documentation of counting units and sub-sites/monitoring units within a site;
 - Maintaining the site coordinator and observer network, having good contacts with all organisations involved, organize training and motivate and stimulate;
 - Concrete planning and organizing of the field work, ensuring appropriate, rigorous and standardized monitoring;
 - Compilation and checking of data, stimulating of a quick collection of the data, performing quality check and storage for national use;
 - National reporting and facilitating optimum use of the data collected in analysis and reporting for government, other institutions and stakeholders and observers;
 - Submitting the data for international use.

4.2.2 Mobilizing and maintaining resources

■ Making a budget and allocating funds

Making a realistic annual budget and preparing a strategy for allocation of funds provides the framework for all activities. Optimum allocation between coordination, training, costs of fieldwork and equipment, data management, analysis and reporting is a key part of successful national coordination of a monitoring programme.

■ Sources of funding

Governments; monitoring species and sites are important for national policy and management. It are also national obligations under many Multilateral Environmental Agreements (MEAs) and any government which takes its international commitments and reputation seriously should ensure that monitoring programmes are funded.

National institutions, both governmental and non-governmental working in the field of nature conservation, natural resources and science should work together making national monitoring possible by making equipment (cars, boats, gps, etc) and qualified personal available as part of their yearly work programme.

National and international funds; many different funds exist, both governmental and non-governmental in the field of nature conservation, sustainable use of resources, and (inter)national development which are open for applications. It is often beneficial to formulate integrated projects, both focussing on conservation, sustainable development and the monitoring of results. Also working together, both nationally and internationally, will help in making successful applications.

4.2.3 The site inventory

■ Compiling an inventory of wetland and waterbird sites in a country

An important task of the national coordinator of waterbird and wetland monitoring is to prepare and maintain an inventory of wetland sites in the country and sites to be covered during the monitoring. Any sites already having international or national scale recognition (e.g.

Ramsar sites, wetland IBAs, wetland National Parks etc.) should be included in the inventory. Additional also other wetlands and sites possible important for waterbirds should be included in the inventory as well. This includes also rice-fields, saltpans, harbours, sea shore etc. which can be important for waterbirds. Ideally all wetland and waterbird habitat should be subdivided in sites and included in the inventory. It will be good to indicate for each site which are important for breeding and/or non-breeding waterbirds. Based on the total inventory choices can be made which sites or parts of sites will be included in the (annual) monitoring (see below).

■ Priority sites for annual monitoring

Sites for annual monitoring; to provide the basis of national and international waterbird population trends, a sample of relatively small sites or sub-sites from large sites in each country is needed where coverage can be guaranteed every year in January, and, ideally, July. The approach should ensure that each site/sub-site is counted in the same way, using the same boundaries and counting routines, every year. This sample of annual sites should suit the capabilities of the observer network and can grow through time. Results become more robust if more sites and a larger proportion of



Carrying out monitoring also requires preparatory discussions on best methods, distribution of tasks and studying of maps.



Discussing priorities for monitoring.

the total number of waterbirds is present in the annual sample but it is important that the effort and quality of the results can be maintained every year.

■ Priority sites for the Total Count

Sites to be included in the 'Total Counts' every 3-6 years; to provide a sound basis for estimating the total number of individuals per country and in international (flyway) populations, an effort should be made every three to six years to count as many sites as possible in each country, including all the most important ones. For migrant and non-breeding waterbirds the month of January is best suited. For colony breeding waterbirds more species specific choices need to be made about the timing for the best results (Veen *et al.* 2006). These "total counts" will give information on total bird numbers in the region, and information on key-sites which cannot be counted in the yearly programme.

■ Additional sites and reconnaissance surveys

For sites which have rarely or never been monitored, it will be necessary to organize reconnaissance visits to establish the importance and need for monitoring and the best counting routines.

■ Maps and boundaries

For monitoring and using monitoring results to advise policy and management it is needed that both sites, counting units and sub-sites are clearly defined by boundaries depicted on maps (figure 5). Preferably these maps are available digitally using GIS software and/or by using Google Earth and should also be available on paper to be used in the field. The maps should give enough detail to ensure that observers know exactly which area they have to monitor. Boundaries should follow natural features which are easy to discern in the field, and should as far as possible reflect the usage of sites by birds.

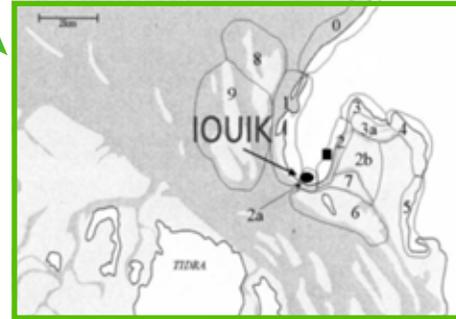
■ Site codes

Each site should be given a unique, short code for use in paperwork and databases. Use of site codes greatly reduces errors caused by spelling mistakes and the use of different site names by different observers. Also counting units and sub-sites should be given a code. Preferably this code should clarify the relationship between counting units, sub-sites and the total site. Sites included in the IBA and IWC programmes have already been given codes whose use should continue. Newly covered sites should be given codes by the national coordinator in consultation with Wetlands International and BirdLife International.



Sites, monitoring units and counting units

Figure 5. The site Banc d'Arguin with example of monitoring unit (within blue box) and counting units (from Zwarts et al. 1998, Spaans 2006). The insert within green box shows the same monitoring unit with its counting units.



Ruddy Turnstone.



At mudflat areas fringed by mangroves, waterbird counts should be done during low water.

4.2.4 The observer network

■ Important task

Finding, training, motivating and maintaining a network of site coordinators and field workers is one of the most important tasks of the National Coordinator.

■ Sources of observers

If possible, participants in monitoring should be attracted from both governmental and non-governmental organizations. Professionals such as staff working in protected areas, wildlife rangers, hunting inspectors and employees of Conservation NGOs should form the core of the network. The monitoring programme should also be publicized at research and educational institutes, among nature guides, among local communities living close to sites, and among hobby birdwatchers and other nature enthusiasts.

■ Publicity

Creating a network of observers will take time but can be helped by good publicity. Coverage in the media generated by press releases, and other communication activities such as newsletters and blogs can also generate valuable publicity.

■ Training

When a number of observers have been found, training in bird identification and counting

methods, and in the recording of threats and site conditions, should be organized, using materials produced by Wetlands International, BirdLife International and others (see 1.4 above). Training is most effective if it is carried out at the sites to be monitored, with methods explained and practiced in the field. These training visits can be used to establish the best routines for counting sites, identifying the number of observers needed, the best vantage points from which to count the birds, the best ways of getting around the sites, using maps to ensure optimum coverage, and other practical considerations.

■ Allocating observers to sites

National Coordinators should use maps and the knowledge of their network to decide how many observers will be required at each site. Small and medium sized sites, up to a few square km in extent, can usually be counted by two observers in up to four hours. Larger and more complex sites may require a group of counters working over several days.

■ Assessment

Assessing the skills of counters may be necessary to evaluate the quality of data produced by monitoring and to ensure that observers are not given too much responsibility before their skills are sufficiently developed. This needs to be done sensitively to avoid discouraging observers.



By working together during a bird count, species can be divided among the counters.

■ Routine provision of paperwork

Once the observer network has been trained, it is the National Coordinator's job to ensure that they are supplied with the manuals, maps, site protocols and recording forms (paper and/or electronic) that they need to monitor the sites. These tasks should be done as part of an annual routine, and should act as reminders to observers, so that, for example, observers receive a newsletter and new recording forms two to four weeks before each site visit is due. It will often also be necessary to send reminders to observers to submit their data.

■ Motivating observers

The National Coordinator is also responsible for maintaining the enthusiasm of the network by providing timely feedback on monitoring in the form of newsletters and reports. Being available to answer questions and solve problems is also very important. Observers should get a feeling of ownership of their site and its data, of being valued by the organizers of the monitoring scheme, and of belonging to something important and influential.

4.2.5 Planning and organizing fieldwork

■ Clear planning and schedule

National Coordinators should draw up a

schedule of fieldwork for their country each year, taking account of the internationally recommended count dates and the optimum timing of high tides. The schedule should be included prominently in a newsletter sent to all counters at least once per year, and an additional reminder should be sent to counters two to four weeks before each count.

■ Summarized schedule of fieldwork - years and months

- Non breeding Waterbirds
 - Comprehensive monitoring at as many sites as possible to provide the basis of waterbird population estimates - **every six years as a minimum in January**;
 - Monitoring at a selected sample of sites or sub-sites to provide the basis of population trend analysis - **every year in January**;
 - Additional counts during the year to gain an understanding of seasonal variations and importance in other months - **at months with peak numbers, sometimes every month, July as a priority if possible.**
- Breeding Waterbirds
 - Complete survey - **every three - six years**;
 - Selected sample of sites - **every year**;
 - **Months of survey depends on species.**



PHOTO Dave Montreuil

Common Ringed Plovers in their non-breeding plumage during roosting.

- Registration of environmental conditions and threats at sites - **on every visit.**

■ Schedule of fieldwork - time of day and counting dates

- Inland sites, without tidal influence, are normally counted during the morning hours or later afternoon when it is not too hot and light conditions better than during mid-day. Be sure that a site is more or less counted on the same hours of the day each year.
- Coastal sites, with tidal influence, are normally counted over the high tide period, allowing about four hours to cover each count unit. Mangrove areas and the nearby mudflats are, however, best covered during low tides. Tidal cycles vary, but high tide normally occurs every 12 ½ hours or so. Tidal amplitude also varies and typically reaches two peaks each month, the spring tides, at full and new moon, and two periods of minimum difference between high and low tide, the neap tides, at intervening mid-points. Tide tables should therefore be consulted and visits to sites organized on days when the tide is high between about 10:00 and 16:00.
- The traditional dates for counting under IWC in Africa are the weekends closest to the middle of January and July each year. Weekends are chosen to accommodate volunteers counting in their own time. It is best to synchronize counts as closely as possible, but some flexibility is allowed. National Coordinators should check whether the recommended date coincides with a suitable tide and if not, adjust the counting date accordingly.

■ Distribution and retrieval of forms

- National coordinators are responsible for distributing recording forms to observers before each site visit and retrieving completed forms afterwards. This can be electronic or hard copy forms. It is important that observers going into the field know which species they need to count and other information they are going to collect and what they have to write down in their note books. National Coordinator should send a short message to all counters with this information. Wetlands International and BirdLife International produce hard-copy and electronic forms for use.
- It is essential that national coordinators

send out the forms two to four weeks before the visit, and that observers return them promptly afterwards. One recording form should be used to record waterbird numbers in each counting unit and one form to record environmental conditions, threats and conservation measures at the site in total.

■ Distribution of maps

It is essential to use the same boundaries for sites, sub-sites and counting units each year. Maps (on paper or GPS) should be used in the field to ensure that this happens. National coordinator should ensure that site coordinators and field workers have these maps.

4.2.6 Compiling and checking the data

■ Checking recording forms

National Coordinators should check that all forms submitted to them after monitoring (whether paper or electronic) have been accurately and completely filled out, and get back to observers promptly with questions about any missing data or unlikely-seeming species or count totals.

■ Zero counts and species 'present but not counted'

If a site or a counting unit is visited and no birds are found, it is essential to submit a nil return, so that analyses of data from the site include a zero count of each species. If it is known for certain that a site is dry because of drought, for example, it is acceptable to submit a nil return without visiting the site.

If any waterbird species is present at a site but not counted for any reason, it is also important to enter the species as being present but not counted. The usual method of recording such a species is to enter a total of -1 for any species that was present but not counted.

■ Data entry and storage

When all forms (paper or electronic) have been checked, the data should be entered into a database. Using the standard excel format, as provided by Wetlands International, is a good way to standardize this data entry into national and international databases.

■ Back-ups

National Coordinators should ensure that all electronic data are backed up and copies stored in physically separate locations. Original

field data and paper forms should also be stored safely in a logical filing system and should be available for checking if necessary.

4.2.7 National reporting

■ National level data analysis

Data should be analysed for national purposes. National level analyses can be prepared using widely available software tools. Simple annual summaries showing national count totals for each waterbird species and count totals for each species at each site can be produced, and maps showing the numerical distribution of each species can also be prepared. Simple summaries of threats, environmental conditions and conservation actions at sites can also be produced. As the time series of data grows each year, comparisons of numbers and distribution in the reporting year with the base year, or with averages for the past five or more years become possible.

4.2.8 Submitting the data for international use

■ Submission of data for international analysis and reporting

After the data have been compiled and checked they should also be submitted elec-

tronically to Wetlands International and BirdLife International. Using the standard excel format, as provided by Wetlands International, is a good way to send the data to the IWC. Standard procedures recommended by Wetlands International and BirdLife International should be used.

4.3 Site coordinator and field worker

4.3.1 Rewards of being site coordinator and field worker

- Intimate knowledge of the site and its biodiversity.
- Being out in the field, is healthy and fun, it is good exercise and often very beautiful. It is often a welcome change of normal working routines and a living inside offices.
- You contribute to the conservation of the site and its biodiversity.
- Having good skills in field identification, counting and monitoring and organizing field work enables you to participate in several projects.



PHOTO Peter de Boer

Field work in practice. Good cooperation with one taking notes, one keeping an eye on the boat and two counting.

4.3.2 Skills and tasks

- Site coordinators are responsible for coordinating fieldwork at large and complex sites which require a team of observers to monitor them. They should ensure that everybody in the team knows the date and time of each count and the boundaries of the site, sub-sites and counting units.
- Site Coordinators should also ensure that all the counters at the site have the equipment they need and an understanding of their responsibilities. An informal team meeting before each count is a good way of ensuring that everybody is present and prepared.
- They should compile the data from every counter after each count and submit all the data to the National Coordinator. It is important for all observers who have counted a complex site to meet after the count to discuss issues arising at the boundaries of their count units, such as the possibility of double-counting or under-recording flocks moving across boundaries. If time and logistics allow, this can be a good time for everybody to complete their recording forms and submit their data.
- The field observers are the professionals and volunteers who collect bird count and site data in the field. Bird counters should be trained in the identification and counting skills detailed below. Observers collecting site data should have knowledge and understanding of the site's ecology, its use by people and its management, and through familiarity with the site should be in a position to assess changes in these factors.

4.4 Non-breeding waterbird counting

4.4.1 Geographic boundaries of the site and counting units

- Sites or sub-sites are selected for monitoring by the National Coordinator in cooperation with site coordinators and field workers familiar with particular sites and regions of the country. It is essential that site coordinators and counters are familiar with the geographic boundaries of the site and its counting units, and use maps to ensure that the correct boundaries are used on every visit (see figure 5).

4.4.2 When to count

■ The importance of regular, standardized counting

Monitoring procedures involve collecting data in a series of visits to a site and using the data to build a picture of changes over time. This approach only works if the procedures followed on each visit are identical (or, in the real world, as similar as possible), a process known as standardization. Changes in count totals and in environmental conditions and threats can be identified and measured if they are recorded in the same season (the same month each year), at the same state of the tide, using the same walking route and the same observation points, and ideally, the same observers using the same equipment for every visit.

4.4.3 Which species?

- The species included in counts are those defined as "waterbirds" and include all species in the following families: Grebes, Pelicans, Cormorants, Darters, Herons, Storks, Ibises, Spoonbills, Flamingos, Ducks, Geese, Cranes, Crakes, Rails, Gallinules, Coots, Jacanas, Oystercatchers, Stilts and Avocets, Thick-Knees, Coursers and Pratincoles, Plovers, Sandpipers and Snipes, Gulls, Terns and Skimmers. Depending on national decisions also sometimes water dependent raptors and kingfishers are counted.

4.4.4 Equipment

- The equipment needed for counting waterbirds is simple, comprising optical aids to enable correct identification and accurate counting, and a means of recording observations, principally, the numbers of birds of different species counted.

■ Binoculars

Binoculars are essential. Those with a magnification between 8x and 10x, and an objective lens diameter of 30 to 50 mm are most widely used. Magnification above 10x is rarely useful because it is difficult to hold more powerful binoculars steady. An objective lens below 30mm in diameter performs less well in poor light conditions, and one above 50mm is too bulky for most observers.

■ Telescope

Identifying and counting birds are usually more

accurate if a tripod-mounted telescope is used. It is possible to manage at some sites without one, but large sites where the birds are frequently more than 500m distant are best covered using both binoculars and a telescope. It is useful when counting to have a wide angle of view, and a telescope with 20x or 30x magnification is preferable for this reason. Zoom lenses have a narrower field of view, but they are flexible, and the high end of the zoom (often up to 60x) is useful for reading ring numbers (bands) of marked birds or for clinching identification of distant and difficult species. It is necessary to combine the telescope with a stable tripod, and with a good quality pan head connecting the telescope to the tripod. It is important to be able to pan and tilt the telescope smoothly when working through flocks to identify and count the birds, and only a good quality pan head allows this.

■ Bird identification guide

Observers should familiarize themselves with the field characteristics of all the species they may encounter. This can be done by studying and absorbing the information provided in identification guides. Probably the best book to use in West Africa is the *Field Guide to the Birds of Western Africa* by Nik Borrow and Ron Demey, published by Helm Field Guides. It is wise to always keep a field guide handy in case an unfamiliar species is seen.

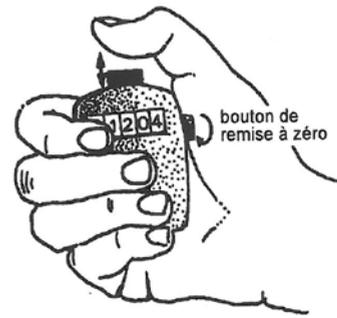
■ Notebook and pencil

Bird counts and other information collected during monitoring visits to sites are best recorded in a field notebook using a pencil. Always carry spare pencils or pens. Pens may not work if it rains, and can dry up at any time. The type of notebook used is a matter of personal preference, but most people prefer a small one with a hard cover that fits into the pocket of a jacket or trousers.

■ Tally counter

These devices (see figure 6) can be extremely useful, especially at sites with large numbers of birds. Experienced observers may use one, two or more tally counters to enhance the speed of their counts and count two or three species at once when making a scan of a wetland. The tally counter can be used to count one-by-one, or, each click of the button on the tally counter can be used to represent a "block" of birds. Experienced counters can accurately estimate 10, 20, 50, 100 or more birds almost

Figure 6. Tally counter (from Veen et al. 2006).



instantaneously, and scan through flocks counting in these "blocks" with a tally counter.

■ Maps and GPS recorders

A detailed map (at a scale of around 1:50,000 or less) is an essential prerequisite for monitoring. On the map the boundaries of the site and the counting units should be visible. The map should be checked before and 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. Once a counting routine is established, the route walked by the counter and the vantage points used for counts should be recorded on a copy of the map, together with locations of breeding colonies, roosts, feeding areas, and similar information. At large and remote sites, a Global Positioning System (GPS) recorder can be invaluable for establishing the spatial basis of counts, and for ensuring that counts of identical geographical areas are conducted on each visit.

4.4.5 Which methods?

■ Safety and comfort

Many counting sites are remote, extensive, tidal, and exposed to all weathers without shelter. For many observers, these conditions add appeal to the count, but counters should ensure that they are properly equipped, clothed and fed to deal with the conditions at a site, and to cope if, for example, they are cut off by the tide. A map, and at remote sites, a GPS are important to help avoid getting lost. A fully charged cell phone should be carried in case of difficulties and it is sensible to carry food, water and, if cold or wet conditions are

possible, a warm layer and a rainproof jacket or coat. A small rucksack is the most comfortable way to carry these bits and pieces.

■ Species identification

The ability to accurately separate and identify the different species present at a site is the first necessity of waterbird counting. Bird identification is a skill which takes time to master. Correct identification includes a process of elimination, and knowing which species are most likely to occur at a site in a particular season reduces the number of species that need to be eliminated from consideration. The best way to learn is to spend time in the field with an experienced observer who is familiar with the field characteristics of each species. Careful note-taking, field sketching and photography also enhance an observer's powers of observation and reinforce memory of field characteristics. When learning to identify birds, time should be spent consulting identification guides and becoming familiar with the plumage patterns, behaviour and annual cycles of each species.

■ Covering the site

■ **Counting route and vantage points:** Counts are normally carried out on foot, and bicycles, motor vehicles and boats may also be used to get around. The site is covered systematically, usually by walking the same route on each visit and stopping every few hundred metres to scan with binoculars and/or a telescope to count the birds. It is important to use the best vantage points, and to divide the site up into areas that are visible from the chosen vantage points without overlap of areas counted and without missing any of the site. Choosing a route for the first time is best done using a map and/or Google Earth.

■ **Light conditions:** should also be considered when choosing counting routes. It is always easier if the sun is behind the observer. Looking towards the sun, details become lost in shadow and observation is made more difficult for the counter, and easier for the birds, which will be less approachable.

■ **Weather conditions:** Observations during extreme weather conditions should be avoided if possible because such conditions affect the behaviour of the birds and reduce counting efficiency: if there is excessive heat haze, heavy rain or gale

force winds, it is preferable to postpone the count until conditions are more favourable.

■ **Tidal conditions:** depending on the type of site all visits should be made at the same stage of the tide. At sites with large intertidal areas and roosting sites at beaches and sandflats counts of birds should be made at high tide. If the intertidal area is rather narrow (500 meters) counts can best be made during low tide or intermediate stages. At sites with large intertidal areas fringed by mangroves counts need to be done at low tide.

■ Scanning and counting the birds

Counts are made by scanning flocks of waterbirds (which usually comprise several species) with a telescope or with binoculars as appropriate, and counting each species one-by-one, or in "blocks" of bigger numbers (see "scanning in blocks" below). A preliminary scan should be made with binoculars, and the overall number of birds and the proportion of each species should be rapidly assessed, in case disturbance or some other factor causes birds to fly away before you have completed more detailed counts. A preliminary scan with binoculars also gives a good idea of the location of the birds in the area being scanned, and of any landmarks, vegetation features, moored boats or other markers that can be used to divide large flocks into smaller units for counting. 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 minimize errors (see below).

■ Counting night roosts

Some species such as herons and egrets, flamingos and gulls, congregate in large roosts to sleep at night. A convenient method of counting these birds is to station observers within sight of the roost in the evening, before the birds arrive, or, more rarely, in the morning, before they leave. Flocks of birds joining or leaving the roost can then be counted. It may be necessary to station observers at two or more vantage points to ensure that birds arriving or leaving in all directions are included. Two or more observers will be needed to

ensure that all species are counted and that large flocks are not overwhelming. Standardization should be ensured by use of the same vantage points at the same sites at the same time of day in the same month every year.

■ Counting skulking species

Species such as Crakes, Rails and Snipes that habitually hide out of site in dense vegetation cannot be accurately counted. Observers should refrain from disturbing the vegetation in an effort to get these birds to show themselves. If standardised counting routes are used, a small number of these species may be seen and heard on each visit, and changes in the observed portion of the population may still allow analysis of population trends, even if no idea is gained of the absolute numbers of birds present.

■ What to record in the notebook

After recording the site name, date and time of the count, and information relating to weather, habitat and tidal conditions, for example, each species should be given a new line in the notebook, and counts entered as they are made, with each sub-total separated from its predecessor by a comma or a full stop, e.g.: Redshank 104, 11, 29, 6, 1, 5, 36. The counts at the count unit are summed at the end of the visit to give an overall total for each species for the

day, in this case 192 Redshanks. After a count also an estimation should be given of how complete an counting unit was covered, e.g. more than 95%, about 50%, less than 25%.

■ Counting in "blocks"

In large flocks it is not possible to count one by one. The most commonly used method is to get an idea of how much of the group is 10, 50 or 100 of birds and then use this "block" to estimate the other part of the not counted flock (see figure 7). This way of counting needs practice and experience but after doing it a lot it is a reasonable accurate way of counting large groups. It is important that you practice with several observers doing an estimate of the same flock and then after the count compare your results. You will learn of making mistakes and then improve your ability to estimate big groups.

■ Recording zero counts

If a site is visited and no birds are present because of drought for example, it is important to record a zero count and send it to the national coordinator. Failure to do this will result in incorrect calculation of average numbers for the site and incorrect treatment of the site for population trend analyses (the trend analysis programme will assume that the site has not been counted and will impute missing



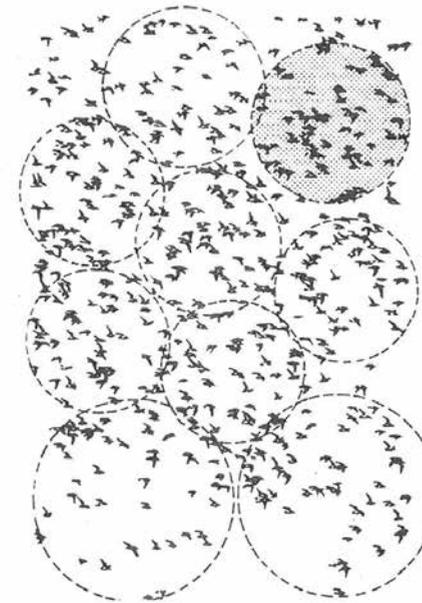
PHOTO Arnold Meijer / Blue Robin

PHOTO Arnold Meijer / Blue Robin

Big flocks need to be estimated in a short time. Test your estimation by doing it several times with the same flock and compare your estimation with others.

values for the species usually counted at the site). If it is known that a site is dry because of drought, for example, it is acceptable to submit a zero return without making a visit. If a site is destroyed and counts stop for this reason, it is similarly important to inform your national coordinator.

Figure 7. Of this flock of birds, an idea of 50 birds is formed (see shaded circle). After that quickly (especially in a flying flock, there is more time when they are standing on the ground or swimming) this idea of how much is 50 birds is used to estimate the other part of the flock. The whole flock is 9 blocks of about 50 birds and there are some birds outside the blocks. This means that there are at least 450+ birds in the flock. The actual number is 491. Note that the blocks can vary in size depending on the density of birds.



■ Recording species 'present but not counted'

Analyses at national or international level assume that all waterbird species present at each site are counted, and when performing calculations for population trend analysis, computerprograms insert a zero for species which are found in the region but which were not recorded during a particular count of a particular site. It is therefore important to make a note of any waterbird species which were present but not counted. The conventional way to do this is to enter a count of -1 for any such species on recording forms.

4.4.6 Submitting the data

■ Count data

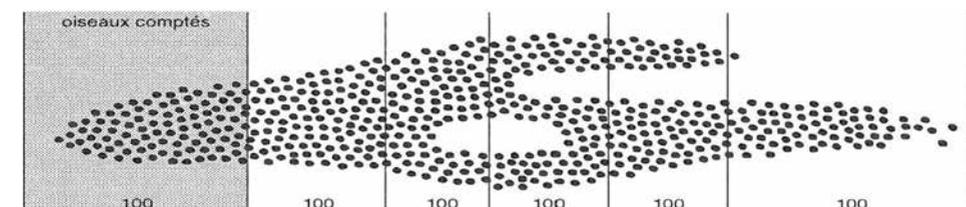
Data should be submitted by counters to the site coordinator or if this level of coordination is not used, directly to the national coordinator immediately after each count so that compilation of the national data is not delayed. Information should be carefully and methodically transcribed from the notebook or recording device onto paper or electronic recording forms as soon as possible after the count. Paper or electronic forms will be provided by the national coordinator for this purpose.

4.5 Breeding waterbirds counting

■ For a description of surveying the numbers of breeding terns and gulls in colonies see Veen et al. 2006, Veen & Mullié 2015.

■ For a quick assessment of the number of breeding pairs in colonies the same method as estimating groups of non-breeding waterbirds is used; counting in "blocks" (see figure 8).

Figure 8. Of this colony a block of 100 nests is counted and then this idea of the size of 100 nests is used to estimate the other part of the colony (from Veen et al. 2006).



4.6 Assessment of environmental conditions

4.6.1 Introduction

■ Purpose

IBA monitoring is needed both to *assess the effectiveness of conservation measures and to provide an early warning of problems*. It should also form a key component of national reports to the Conference of Parties of the Convention on Biological Diversity, and to the Ramsar and Bonn Conventions.

■ Sources of information

Data on environmental conditions and threats are collected by observation in the field, but some aspects should be gained by discussion with the owners and/or managing authorities at the site and with local residents. Reference should be made to all appropriate documents, maps or web pages already compiled about the site, for example if it has been designated as a Ramsar site or listed as an IBA.

4.6.2 Which sites

■ The highest priority for monitoring of environmental conditions and threats should be given to IBAs proposed on the basis of their importance for waterbirds.

■ If possible, however, this monitoring should be done at all sites where waterbird counts take place.

4.6.3 Timing of visits

■ Environmental conditions and threats should be recorded whenever sites are visited to count waterbirds. Potential threats which are not yet visible at the site, such as planned infrastructure developments, should also be recorded. Additional visits should be organized if there are threats in particular months or seasons. Seasonal variations in environmental conditions and threats should also be recorded at sites where waterbird counts are organized in these seasons.

4.6.4 Which threats to record

■ The IBA programme provides a list of 12 major types of threats to sites, each of which has a number of sub-headings. Full details can be found on the recording form. All threats affecting the site need to be given a score for Timing, Scope and Severity of threats. The major types of threat that need to be monitored are:

- Agricultural expansion & intensification
- Residential & commercial development
- Energy production & mining



PHOTO Dave Montreuil

Grey-headed Gulls: adult bird with immatures.

- Transportation & service corridors
- Over-exploitation, persecution & control
- Human intrusions & disturbance
- Natural system modifications
- Invasive & other problematic species & genes
- Pollution
- Geological events
- Climate change & severe weather
- Other

4.6.5 How to record threats

■ Two main approaches are adopted when assessing threats. One is looking at the existing pressures, i.e. those that are possibly affecting the trigger species at the site at the current time, and involves assessment of each of these pressures. The other is assessing new, emerging threats. This approach needs to assess future changes, and how those changes are likely to affect the trigger

species (or their habitat). It is important to note that the extent of any of the activities listed below is only relevant if it is a threat to the status of the trigger species.

■ Observers should use the data form in the field to record the timing, scope and severity of threats as acting on the qualifying species (the species for which the site is most important) Mapping the threats can be a useful way to collect information and assess the scope and severity of threats. Maps and recording forms from the previous visit can be used to help assess changes in threat attributes in the field.

■ Threats are scored using values between 0 and 3, and scores are given for three aspects of threats: Timing, Scope and Severity. The scores are not based on exact measurement. Observers are required to make assessments based on the following list:

Timing of selected threat	Timing score
- Happening now	3
- Likely in short term (within 4 years)	2
- Likely in long term (beyond 4 years)	1
- Past (unlikely to return) and no longer limiting	0

Scope of selected threat	Scope score
- Whole area or bird population (>90%)	3
- Most of area or bird population (50-90%)	2
- Some of area or bird population (10-50%)	1
- Small area or few individual birds (<10%)	0

Severity of selected threat	Severity score
- Rapid deterioration (>30% over 10 years)	3
- Moderate deterioration (10-30% over 10 years)	2
- Slow deterioration (1-10% over 10 years)	1
- No or imperceptible deterioration (<1% over 10 years)	0

4.6.6 How to record habitat

- In addition to changes in bird numbers of the important species of a site it is also possible to describe the state of a site according to the area and quality of its habitats.
- Observers should use the data form in the field to record the habitat area and quality as acting on the qualifying species (the species for which the site is most important).
- Use of maps and Google Earth images is recommended to help with assessment of habitat area, especially for the first visit to a site. Assessments are always made relative to the presumed state of the site under natural conditions and it should be remembered that modern maps and Google Earth images often represent the site in a deteriorated state.

If the actual habitat area is not known, a best assessment of the current habitat area at the site, in relation to its potential optimum if the site was undisturbed, should be provided.

Information should be provided on the area and quality of each habitat at sites, as follows:

Habitat area

The area of each habitat should be scored as:

- Good (overall >90% of optimum)
- Moderate (70-90%),
- Poor (40-70%) or
- Very Poor (<40%).

Habitat quality

The quality of each habitat should be scored as:

- Good (overall >90% of optimum)
- Moderate (70-90%),
- Poor (40-70%) or
- Very Poor (<40%).



PHOTO Arnold Meijer / Blue Robin

Sanderlings occur mostly on beaches and sandy mudflats.

Figure 9. Monitoring Important Bird and Biodiversity Areas : scoring overview

Variable	Status	Trend
Pressure		
	Scores	Trend scores
Timing	0,1,2,3	
+	+	
Scope	0,1,2,3	
+	+	
Severity	0,1,2,3	
=	=	
Total (Impact)	0-9 → 0,-1,-2,-3	→ Status score from Year 2 – Year 1 → -3,-2,-1,0,1,2,3
State		
	percentage remaining	Trend scores
Populations or habitats	<40, 40-70, 70-90, >90 → 0,1,2,3	→ Status score from Year 2 – Year 1 → -3,-2,-1,0,1,2,3
Response		
	Scores	Trend scores
Designation	0,1,2,3	
+	+	
Planning	0,1,2,3	
+	+	
Action	0,1,2,3	
=	=	
Total	0-9 → 0,1,2,3	→ Status score from Year 2 – Year 1 → -3,-2,-1,0,1,2,3

4.6.7 How to record conservation actions

Information should be provided on the conservation actions taken at sites under the headings Conservation designation, Management planning and Conservation action.

Conservation designation

Information should be recorded on the estimated proportion of the site covered by appropriate conservation designations. How much of the site is included in the National Park, Ramsar site or other designated area?

Management planning

Information should be provided on the stage of management planning reached at the site. Does the site have a management plan? Is it comprehensive and up-to-date?

Conservation action

Information should be provided on the stage

of implementation of conservation measures reached at the site. Are conservation measures being implemented? How comprehensive are they?

Information should also be provided about Local Conservation Groups and about conservation activities undertaken at sites. The organizations, institutions or conservation groups undertaking the following activities should be recorded:

- Land and water protection
- Land and water management
- Species management
- Education & awareness
- Law & policy
- Livelihood, economic & other incentives
- External capacity building

This information should be obtained, if possible, from local residents, landowners, site

managers and other stakeholders, with the assistance, if necessary, of the National Coordinator.

4.6.8 Scoring overview for threats, habitat and conservation actions at sites

■ Observers should familiarize themselves with the scoring system recommended by BirdLife International and take a copy of the recording form and instructions into the field as a reminder. Threats lead to the Pressure score at a site, habitat and the changes in bird numbers lead to the State score at a site and the conservation actions to the Response score at a site. Figure 9 is a summary of the scoring system.

■ This scoring is mostly carried out by the national coordinator on the basis of all the IBA forms received and additional information for a certain site in a year.

4.6.9 Submitting the data

■ Submitting data on threats, habitat and conservation measures

One form should be used to record each visit to each site. The data from the previous visit can be used in subsequent visits to reduce work and help maintain consistency in assessments. It will be necessary to copy up field data onto a new, fair copy of the form, or onto the online version, before submitting the form to the National Coordinator.



PHOTO: Arnold Meijer / Blue Robin

Grey Plover. The Atlantic seaboard of Africa is a major non-breeding area for this arctic breeding species.

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