

# Estimating international waterfowl populations: current activity and future directions

*Paul Rose & David Stroud*

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A small international workshop was recently organised by the International Waterfowl and Wetlands Research Bureau (IWRB) and the UK Joint Nature Conservation Committee (JNCC) which considered current activity and future needs for the estimation of international waterfowl population sizes in the Western Palearctic and the uses of these data, especially with respect to the requirements of the Ramsar Convention. The workshop was held at Kalø, Denmark from 11-13 January by the kind invitation of the Danish National Environmental Research Institute. It had two principal objectives.

First, it considered the current mechanisms for the co-ordination of information necessary to assess international population sizes of waterfowl. This concentrated especially on the identification of the different uses of these data and the basic requirements of the different groups of data 'users' (e.g. researchers, national and international NGOs, government conservation bodies, conventions and ministries). The meeting made recommendations for further improvements to current mechanisms, especially in the light of the Ramsar Convention's recent recommendation that international waterfowl population estimates be updated every three years in line with meetings of the Contracting Parties.

Second, the workshop considered comments made on the draft report prepared in 1993 by IWRB, Asian Wetland Bureau (AWB) and Wetlands for the Americas (WA) which aimed to summarise current estimates for waterfowl populations world-wide. Since there was a need to finalise these waterfowl estimates for the Western Palearctic, the meeting considered outstanding issues. The meeting also addressed options for further improvements in the future reporting of international waterfowl estimates in the light of this first report, and made recommendations for such improvements.

The meeting recommended two cycles of review to be undertaken:

- a three year cycle of revision of population estimates for Western Palearctic waterfowl (i.e. for every Ramsar Conference); and
- a nine year cycle of revision of 1% thresholds for Western Palearctic waterfowl (every third Ramsar meeting), unless major population change occurs.

In undertaking these reviews, a two stage model is proposed:

- first, published taxa-related reviews (produced e.g. by IWRB Research Groups/Database co-ordinators and others to an agreed forward plan); and
- second, a global summary report drawing on review papers (produced by IWRB/AWB/WA).

The meeting noted the great importance of ensuring that one internationally-agreed set of officially reported population levels were available for use by the Ramsar and Bonn Conventions, and other international treaties. IWRB should co-ordinate the establishment of common protocols on the use and revision of these data.

The meeting focused on the issues surrounding waterfowl population estimates in the Western Palearctic, but throughout the meeting it became clear that many of the points under discussion were relevant also to other parts of the world, and that future discussions should include representatives from other regions. The outcome of the meeting will be taken forward in the planning of the March 1996 meeting of Ramsar Contracting Parties in Brisbane, Australia.

*Rose, P., IWRB, Slimbridge, Gloucester GL2 7BX, UK.*

*Stroud, D.A., JNCC, Monkstone House, City Road, Peterborough PE1 1JY, UK.*

## INTRODUCTION

The 1% criterion has for many years been used to identify

wetlands of international importance for their waterfowl populations, especially those which should be brought within the list of sites conserved under the Ramsar

Convention.

The criterion identifies sites as of international importance if 1% of the waterfowl of a particular migratory flyway or population regularly make use of a wetland at any time during their annual cycle. This simple, and globally applicable criterion, to which other criteria have more recently been added, has played a major rôle in the identification and listing of sites under the Ramsar Convention.

There is no fundamental biological reason to take 1% of a population as the threshold level for establishing international importance of a site. However, this percentage has been found by long experience and evaluation to be useful in giving an appropriate degree of protection to many populations except when widespread and dispersed, and in the definition of ecologically appropriate sites. The criterion has, therefore, gained worldwide acceptance.

The wide use of this numerical criterion in site selection depends crucially however, on the establishment of the size of the international waterfowl populations concerned. This provides the necessary baseline from which the 1% threshold is derived for any species or population.

The long-term collection of baseline data has been undertaken through the International Waterfowl Census (IWC) of IWRB - itself working with and alongside other national (e.g. WeBS in the UK) or international counting schemes, and specialist surveys for particular taxa.

The revision of international population estimates has, until now, been undertaken previously on an *ad hoc* basis, with the last major reviews of Western Palearctic waders and Anatidae being presented at the 1987 Ramsar meeting in Regina (Smit & Piersma 1989; Piro *et al.* 1989). There has formerly been no internationally agreed timetable for the revision of population estimates and 1% thresholds.

The meeting noted the great importance of ensuring that one internationally agreed set of officially reported population levels were available for use by the Ramsar and Bonn Conventions, and other international treaties, as well as other users such as national conservation agencies and non-governmental organisations.

## CURRENT REVISION OF INTERNATIONAL POPULATION ESTIMATES

A report was prepared by IWRB, AWB and WA for the Kushiro Ramsar Conference in June 1993. This consultation draft brought together for the first time all data on waterfowl population estimates from all over the world and has now been published (Rose & Scott 1994). The report suggested 1% thresholds for some populations, and where possible, indicated trends in the

development of populations. It also updated population levels and 1% thresholds where these exist.

There was an urgent need to finalise these estimates for waterfowl populations occurring in the Western Palearctic, as well as to consider the comments made on their presentation by interested parties. There was also a need to consider in detail the future co-ordination and timetable for the preparation and revision of international waterfowl population estimates, involving strategic consideration of data collection, analysis and use by a variety of partner organisations and bodies. The meeting considered the current and future development of this key area of conservation science, drawing on the expertise developed in north-western Europe and especially in those countries with sophisticated systems for waterfowl monitoring and conservation delivery.

## COMMON DIRECTIONS IN INTERNATIONAL POPULATION ESTIMATION

The collation of data for the draft report highlighted a number of areas where review was necessary. This follows experience in some countries active in the designation of large numbers of Ramsar sites and their subsequent defence through complex legislation and legal planning processes.

In some European countries (as well as other areas outside the Western Palearctic), the Ramsar designation gives an additional level of strict protection for a wetland over and above that provided by domestic legislation. In this regard, the designation attracts particular attention from developers and others whose activities may be damaging to the site. There are often challenges to the designation, not only at the time it is made, but on a continuing basis. This may involve the legal defence of the site through courts, planning inquiries and other procedures. The consequence of this is that population estimates used in site selection must be defensible to the greatest degree possible, and their derivation must have involved the highest possible scientific standards.

In other parts of the world, lack of adequate domestic legislation places a heavy reliance on site protection through international designations such as Ramsar listing. In some areas, the quality and quantity of data may be such that only 'best estimates' are available for some waterfowl populations. Even these data provide a vital basis throughout much of the world for providing a basis for flyway site safeguard and for driving nature conservation forward.

The workshop considered the development and use of population data specifically as related to the Western Palearctic region. It was noted that although many of the issues related to data were especially acute in NW Europe (from where workshop participants came), population estimation had to relate to appropriate biogeographical

units - in this case the Western Palearctic or East Atlantic Flyway. It was also noted that issues involved were often common throughout the world and there would be benefits for other regions in undertaking similar review exercises.

The challenge faced in deriving one global report is to ensure that both situations with a well developed information base and those areas where detailed extensive counts were not available can be catered for, bearing in mind that the current experience of the former situation may be useful in guiding the development and growth of counting in the latter.

Underpinning the collection and interpretation of waterfowl population data is the need for a common and agreed terminology. In the light of confusion over the taxonomic scope of the terms "waterbird" and "waterfowl", the meeting considered these, and other definitions, as outlined in the Appendix.

### *Data collection and collation*

The workshop addressed the processes involved in waterfowl population estimation in the Western Palearctic, especially with regard to the uses and users of information generated.

For the Western Palearctic, the meeting reviewed the structures for current collection of data on waterfowl population size, and the adequacy of present collection procedures. Particular attention was given to seabirds as some of these species are now classified (in some definitions - see Appendix) as waterbirds. It was noted that principal population census was through breeding season census, especially of colonial species, and that there were currently only weak structures for the regular collation of such data at an international level.

Most data for most non-breeding waterfowl are collated through the International Waterfowl Census. There is sometimes interpretation of this information by IWRB's Research Groups (e.g. for seaducks, geese and waders).

### *Regularity of revision of totals*

Resolution 5.9 of the 1993 Kushiro Ramsar meeting requested IWRB to update population figures used to derive 1% thresholds on a three year cycle in line with meetings of the Contracting Parties.

Concerns were expressed that full revision of international 1% thresholds every three years is too frequent. The value of the 1% thresholds is that they provide a medium term, consistent base-line against which to evaluate sites in an international context, set priorities for species planning etc. If they change too frequently, this stability is lost and no sooner have one set of criteria been produced, and disseminated through governmental systems to a local level, than another revision is due. This could cause considerable practical problems in a number of countries,

for example, with the constant need to revise national lists of sites qualifying as of international importance, and with sites coming on or off shadow lists of qualifying sites as populations alter in size through the effects of natural changes in productivity and mortality.

Many waterfowl undergo substantial natural year-to-year population change, owing to variations in breeding success and/or winter survival. A too frequent revision of 1% thresholds is especially a problem for these populations since changed 1% thresholds may only reflect short-term natural variation rather than real population change.

There is generally an inverse relationship between frequency of population revision and geographical scale. At the level of the individual site, at least annual, if not more frequent, assessments are necessary in order to fine-tune site-management. At national and international levels, the currency used by conservation practitioners (the population estimate) needs to change *less* frequently to be most useful. At a national level, we probably need to review populations about every 3-5 years, and at the scale of the international population estimate and for 1% thresholds, a frequency of change in the order of nine years has been suggested.

This is obviously something for the Ramsar Parties themselves to consider in due course, but the meeting considered it desirable in future revisions of the report to update international *population levels* (where necessary/appropriate) every three years, but to aim to avoid changing *1% thresholds* on this timetable unless there has been a change of significant magnitude (c. 20% - guidelines to be agreed) that makes this likely to be a real change and thus really necessary.

The process has two separate elements:

- a) the desirable frequency of revision of 'true' population totals; and
- b) the desirable frequency of revision of 1% thresholds (i.e. the nominal totals which may vary slightly from time to time from the true total).

This in turn led to a consideration of the *use* of these two elements by a variety of parties. There are a number of potential user-groups, including:

- international conservation agencies (e.g. IWRB, BirdLife International, IUCN etc.);
- Convention and international bureaux (e.g. Ramsar Bureau, Bonn Convention Secretariat, European Commission etc.);
- academics and specialist research groups (e.g. Wader Study Group);
- government ministries responsible for the designation and protection of sites and species; and
- governmental and non-governmental conservation

bodies involved in the identification of sites and their management for species.

Different users have different needs from the population totals. The system of revision must be flexible enough to satisfy most users most of the time (recognising that it may not be possible to please all users, all of the time!).

For conservation scientists, knowledge of annual year-on-year population changes is important to monitor the health of populations (and to give data for modelling etc.). For advising governments and conservation practitioners there is no need for a full new set of published international population levels to be made each year.

## TIMETABLING AND PLANNING OF FUTURE POPULATION REVISIONS

The meeting agreed a parallel programme of scientific dissemination of population estimates (detailed taxa reviews e.g. for geese, waders, seaducks) slightly ahead of the timetable for the global summary report. These reviews will be published *in advance* of their use in a global summary.

Such dual dissemination (review papers and global report) would not only show how data were derived (the review papers for particular taxa), but at the same time give a global vehicle for presenting 'best-estimate' information where these are the only sources (much of the world). The workshop gave consideration as to how such planning might take place, and how to integrate with other groups (e.g. those concerned with seabirds) for maximum effectiveness.

The result is a system which gives a scientifically sound international benchmark, especially inasmuch as this ensures that all international data ultimately used to underpin site selection at a national level are clear, published and open to critical inspection by third parties.

## CONCLUSIONS

### *Mechanisms for future revisions of international waterbird population levels*

#### OBJECTIVE

To prepare one agreed, and recognised, source of information in the world, documenting waterbird population levels to a regular reporting timetable, whilst accommodating, to the greatest extent possible, the requirements of international conservation bureaux, and governmental and non-governmental users.

#### TIMETABLE

The meeting recommended that two cycles of review

would be most appropriate:

- a three year cycle of revision of population estimates for Western Palearctic waterfowl (i.e. for every Ramsar Conference);
- a nine year cycle of revision of 1% thresholds for Western Palearctic waterfowl (every third Ramsar meeting), unless there has been a change of significant magnitude (c. 20% - guidelines to be agreed) within a three year period. (The separation of revision of population estimates from 1% thresholds and their use in applying the 1% criterion is important to avoid rapid changes of lists of qualifying sites consequential on short-term population changes.)
- It was understood that other regions may wish (or need) to change 1% thresholds every three years as in other parts of the world there is a much more dynamic rate of change of information.
- A timetable for next decade was agreed (Table 1).

#### FORMAT

In undertaking these reviews, a two stage model was suggested:

- firstly, published taxa related reviews (produced to an agreed forward plan - Table 1); and
- secondly, a global summary report drawing on review papers (produced by IWRB/AWB/WA for Ramsar Convention).

Published global summary reports on waterfowl population levels should have the following format:

- All primary estimates will be directly sourced or have a clear audit trail.
- Wherever possible, estimates will be derived from published or other reviewed data - *not* taken direct from databases (i.e. databases help to form the basis of the taxa related reviews).
- It would be useful to include maps showing the geographic extent of estimates; however this will need further investigation.

#### PROCESS

- Revision of the global report will be undertaken every three years for meetings of Ramsar Contracting Parties.
- Official 1% thresholds for the Western Palearctic species in the global report will normally be updated every nine years, although with 'emergency' revision of 1% thresholds possible at three yearly intervals if rapid changes of population occur (i.e. population levels are changed every three years, but 1% thresholds are changed only every nine years unless they change by greater than a specific

magnitude (yet to be defined)).

- There is a need to define rules of change. What are the natural limits within which a population can fluctuate before there is a need to revise 1% threshold? A change of >20% was discussed as a rule of thumb. This will need to be discussed at next workshop meeting. [Note that there are conceptual links to the framework of 'alert limits' currently being developed in the UK for waterfowl species].
- It was agreed that there would be no changes of 'official' international population levels or 1% thresholds within three year periods except in an emergency.
- The Workshop recommended that the Ramsar Bureau disseminate 'official' 1% thresholds for use in application of Criterion 3c, possibly as a booklet, and adopt a resolution at the next Ramsar Convention meeting to confirm use of these official 1% population thresholds. This will require the 1996 draft report to be circulated as a Conference paper to Contracting Parties in advance of the next meeting to allow endorsement at the meeting., as was the 1993 report (Resolution C.5.9).

#### *Future workshops/activity*

- The need for advances in ecology and conservation science to be fed into the process of data collation, interpretation and use at national and international levels was highlighted. There are current scientific advances that should be fed into the future conservation agendas. The desirability of a review outlining the scope and possible use of recent ecological advances to this field of waterfowl conservation was noted.
- It was noted that although the present workshop considered the Western Palearctic, this experience may be useful to other global regions in establishing similar and forward-linked programmes of activity. The outcome of this meeting, especially underlying principles, should be disseminated more widely by IWRB (to its global partners) and Ramsar Bureau. There would be merits in Ramsar Bureau convening a wider group to encourage and endorse international co-ordination at a global level.

#### *Achieving necessary coverage*

- For waders, existing datasets are limited by two types of gaps - restricted geographical coverage in some parts of the flyway, and lack of information for non-coastal areas. WSG would need to work to enhance coverage in both these situations. (For the former, and probably the latter, there is a major role for WIWO type expeditions).

#### *Conservation*

- Future meetings need to assess how information can best be used and what other sorts of data would enhance information on waterfowl populations and their conservation. For example, there is little knowledge of the proportion of populations using protected sites on a flyway basis (but see Davidson & Piersma 1992 for an example). IWRB and its Research Groups could derive and disseminate such information, although the process should be detached from the timetable of international population review and reporting.
- There is a need to define nature conservation targets and processes for waterbird species especially with respect to advances in the theory of metapopulations and the application of this to conservation, as well as the importance of turnover, the significance of the loss of sites along a flyway chain, distance between protected sites for species with different migratory patterns etc.. This could be a theme for a future international workshop.

#### **ACKNOWLEDGEMENTS**

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The meeting was attended by Nick Davidson (WSG/IWRB liaison), Tony Fox (Danish National Environmental Research Institute - NERI), Colin Galbraith (JNCC), Karsten Laursen (NERI: IWRB Seaducks Research Group), Jesper Madsen (NERI: IWRB Goose Research Group), Stefan Pihl (NERI: IWRB goose and seaducks databases), Marc van Roomen (SOVON), Paul Rose (IWRB), Derek Scott (IWRB consultant), David Stroud (JNCC), Cor Smit (IWRB wader database), Mark Tasker (JNCC/ Seabird Group), and Janine van Vessem (IWRB). Although unfortunately not able to be present, Birdlife International (Colin Bibby, Melanie Heath, Graham Tucker and Zoltan Waliczky), and the Ramsar Bureau (Mike Smart) sent written submissions which were considered by the workshop and aided deliberations.

#### **APPENDIX: DEFINITIONS**

Terms used are fundamental in the process of designation and conservation of wetlands and their waterfowl. The meanings of the following terms were discussed and agreed.

## Population

Biogeographic populations are normally defined as a more or less discrete group of birds which live in a particular area or group of areas, which interbreed freely within the group and rarely breed or exchange individuals with other groups (Mayr 1970).

## Sub-species/races

Biogeographical populations defined above, sufficiently discrete in time and space to facilitate morphological or other distinguishing features as determined by taxonomists.

## The flyway concept

A 'flyway' is a concept developed to describe areas of the world used by migratory animals such as waders. Flyways can be defined as the migration route(s) and areas used by wader populations in moving between their breeding and wintering grounds. Each wader species and population migrates in a different way and uses a different suite of breeding, migration staging and wintering sites. Hence a single flyway is composed of many overlapping migration systems of individual wader populations and species, each of which has different habitat preferences and migration strategies. From knowledge of these various migration systems it is possible to group the migration routes used by waders into broad flyways, each of which is used by many species, often in a similar way, during their annual migrations.

There are no hard and fast separations between flyways, and their use is not intended to imply any major biological significance. Rather the use of the flyway concept is valuable for the convenience of its approach in permitting the biology and conservation of waders, as with other migratory species to be considered in broad geographical units into which the migrations of species and populations can be more or less readily grouped.

Recent research into the migrations of many wader species throughout Europe and Asia indicates that in this part of the world the migrations of waders can broadly be grouped into five flyways: from west to east being the East Atlantic Flyway, the Mediterranean/Black Sea Flyway, the West Asia/Africa Flyway, the Central Asia/Indian sub-continent Flyway, and the East Asia/Australasia Flyway (source: Odessa Protocol *Wader Study Group Bull.* 65: 12).

## Waterfowl/waterbirds/wildfowl

A long discussion was held as to the different legal and vernacular definitions of these terms. The conclusion was that such confusion now existed over the different forms of national and international usage (especially with respect of the term 'waterfowl') that it was best to taxonomically define the scope of use of these terms every time they are

adopted (especially for quasi-legal documents).

## Regularity

The Conference of Contracting Parties to the Ramsar Convention has defined the term "regularly" as used in the Ramsar site selection criteria. A wetland regularly supports a population of a given size if:

- a. the requisite number of birds is known to have occurred in at least three quarters of the seasons for which adequate data are available, the total number of seasons being not less than three; or
- b. the mean of the seasonal maxima, taken over at least five years, amounts to the required level (means based on three or four years may be quoted in provisional assessments only).

However, in establishing long-term 'use' of a site by birds, there needs to be a full awareness of the ecological needs of the populations protected at that site. Thus in some situations (e.g. sites of importance as cold weather refuges), the arithmetical average number of birds using a site over several years may not adequately reflect the importance of the site. In these instances, a site may be of crucial importance at certain times ('ecological bottlenecks'), but hold lesser numbers at other times. Thus, as always, there is a need for interpretation of data by qualified conservation scientists in order to ensure that the importance of sites is fully assessed (Stroud *et al.* 1990).

There is a need to further refine our definition of 'regular use' of a site with respect to currently available datasets - especially with respect to our better understanding of cold weather needs in northwest Europe.

## Seasonality

Population estimation at the level of the sub-species may be valid for populations that are assumed to be discrete in both summer and winter (e.g. for sedentary species, and some well known migratory species (especially e.g. geese)). However, many separate breeding populations mix in the non-breeding season, making year-round population distinction difficult, if not impossible.

The meeting agreed that in presenting population estimates, the provenance of data should always clearly be stated. With mixed, non-breeding populations, there would usually be a need to clearly indicate the areas and seasons for which a 1% criterion would be valid.

## Site

The last semi-formal definition of 'site' was that of Atkinson-Willes (1976) who presented a study "based on the general rule that a 'site' should not cover more than 25 km of coast, shore or river". Atkinson-Willes *et al.* (1982) provided greater elaboration and stressed also the key

importance of the continuum of habitat (as also reflected in the definitions of Grimmett & Jones 1989 - below). Thus many major estuaries have a shoreline of more than 25 km, but clearly should be considered one site on ecological grounds, linked not only hydrologically but also by the movements of birds within the site.

Grimmett & Jones (1989), in their review of important bird areas in Europe defined a site:

"... so that, as far as possible, it should:

1. be different in character or habitat or ornithological importance from the surrounding land or sea; and
2. exist as an actual or potential protected area, with or without buffer zones, or be an area which can be managed in some way for nature conservation; and
3. alone or with other sites, be a self-sufficient area which provides all the requirements of the birds (that it is important for) which use it during the time they are present.

Important areas in which the habitat is protected for bird conservation should be large enough to provide all the requirements of the birds using them, while they are present." (Grimmett & Jones (1989) modified to incorporate marine sites).

In the identification of marine 'sites' information on relative densities over the sea surface is more important for the identification of important sites than selection approaches based on 1% population thresholds.

#### 1% criterion

The Ramsar Convention established site selection criteria. One such criterion (currently numbered Criterion 3c) indicates that a site is identified as of international importance if it holds 1% or more of a population of waterfowl. A change in the 1% criterion would be if the selection threshold changes to, say, 2% of a population (= the 2% criterion) or 0.5% of a population (= the 0.5% criterion). The term thus relates to the *proportion* (1%) that is used as a criterion of internationally important site selection.

#### 1% threshold

This logically derives from the above and relates to the *number* of birds that are used as the nominal 1% of the population for the purposes of site selection. Thus, an international population of 75,000 Knot *Calidris canutus* has a derived 1% threshold of 750.

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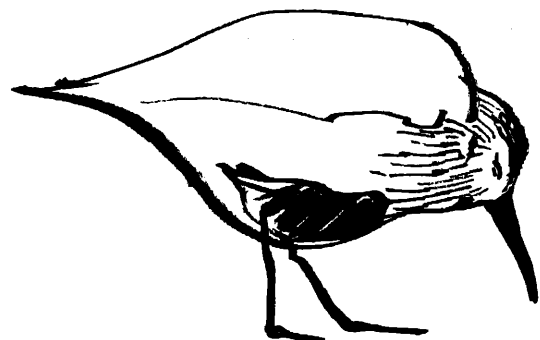


Table 1. Forward plan of activity relating to international estimation of waterfowl population levels, and reporting to Ramsar Convention.

Year	Activity for Ramsar Convention and Ramsar Bureau	Actions for individual countries	Action for IWRB, its Research Groups, database co-ordinators, and others	Action for IWRB HQ (with AWB & WA)
1994			Full taxa reviews for Western Palearctic prepared by IWRB Research Groups	Kushiro report published.
1995	September/October: circulate draft global report to Contracting Parties as Conference paper	Provide advice and data as required. Meeting of Steering Group - summer/early autumn 1995	Full taxa reviews finalised: deadline for submission to IWRB HQ - May 1995	May-August: prepare second global report and transmit to Ramsar Bureau in September. (for Western Palearctic: first full nine yearly review of population levels and 1% thresholds)
1996	March: endorse global report at 6th Ramsar meeting and disseminate 'official' 1% levels	Implement revised 1% thresholds in selection of Ramsar sites for all species		
1997		Provide advice and data as required	Limited taxa reviews for Western Palearctic prepared	
1998			Taxa updates finalised and published	Prepare third global report and transmit to Ramsar Bureau (for Western Palearctic: only population levels changed)
1999	Circulate draft global report to Contracting Parties as Conference paper Endorse global report at 7th Ramsar meeting and disseminate 'official' 1% levels	Implement any revised 1% thresholds in the selection of Ramsar sites		
2000		Provide advice and data as required	Limited taxa reviews for Western Palearctic prepared	
2001			Taxa updates finalised and published	Prepare fourth global report and transmit to Ramsar Bureau (for Western Palearctic: only population levels changed)
2002	Circulate draft global report to Contracting Parties as Conference paper Endorse global report at 8th Ramsar meeting and disseminate 'official' 1% levels	Implement any revised 1% thresholds in selection of Ramsar sites		
2002-3		Ensure co-ordination of adequate species/geographic coverage e.g. single species surveys, seabird surveys, seabird colony counts, rocky shore counts etc.	Co-ordination of period for major survey work to ensure complete international coverage of flyway populations for the Research Group reviews (e.g. expeditions to Western Sahara for waders), and also occasional extensive surveys (e.g. some seabird studies/rocky shorebird counts etc.)	
2003			Full taxa reviews for Western Palearctic prepared by IWRB Research Groups	
2004		Provide advice and data as required	Full taxa reviews finalised and published	Prepare fifth global report and transmit to Ramsar Bureau (for Western Palearctic: second full nine yearly review of population levels and 1% thresholds)
2005	Circulate draft global report to Contracting Parties as Conference paper Endorse global report at 9th Ramsar meeting and disseminate 'official' 1% levels	Implement revised 1% thresholds in selection of Ramsar sites for all species		