PROJECT COMPLETION REPORT

To the Secretariat of the Partnership for the

East Asian – Australasian Flyway

New tools for development of the Flyway Site Network:

An integrated and updated list of candidate sites and guidance on prioritisation

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April 2013

Citation

Jaensch, R. 2013. New tools for development of the Flyway Site Network: An integrated and updated list of candidate sites and guidance on prioritisation. Report to Partnership for the East Asian – Australasian Flyway.

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Cover image

Satellite image of a portion of Notsuke Bay, Japan

Image from Google Earth
(accessed online 11 April 2013)

Acknowledgments

Reference Group members: Lei Guangchun, Paul O'Neill, Cristi Nozawa (assisted by Mike Crosby, Simba Chan and colleagues), Douglas Hykle, Jim Harris, Lew Young, Doug Watkins.

Provision of waterbird count data and site information: David Bakewell, Cao Lei, Simba Chan, Choi Chang-yong, Sundev Gombobaatar, Chris Hassell, Richard Lanctot, Taej Mundkur, Doug Watkins, Yu Yat-tung, Christoph Zockler. Considerable assistance was also provided by Wetlands International in assembling digital data, contribution of graphics and review of technical issues and draft products.

Project administration: Spike Millington, Hyun Seung-joo.

General assistance: Choi Yuna, Kim Minseon, Judit Szabo.

Author's dedication: To the thousands of volunteers who have given and continue to give their time and energy to finding and counting waterbirds in the Flyway, thereby providing the information base that can inform conservation action.

Acronyms and abbreviations

EAAF	East Asian – Australasian Flyway
EAAFP	Partnership for the East Asian – Australasian Flyway
FSN	Flyway Site Network of the EAAFP
GIS	Geographic Information System
MoP2 List	List of Flyway Population Estimates (and 1% thresholds) endorsed by EAAFP at its Second Meeting of Partners, 2007.
MoP6	Sixth Meeting of Partners of EAAFP
MoP7	Seventh Meeting of Partners of EAAFP
PC1	Prioritisation criterion 1
PC2	Prioritisation criterion 2
PC3	Prioritisation criterion 3
WPE4	Waterbird Population Estimates 4th Edition
WPE5	Waterbird Population Estimates 5th Edition

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Executive Summary

Introduction

1. The Flyway Site Network (FSN) is a foundation of the Partnership for the East Asian – Australasian Flyway (EAAFP). Development of the FSN is described in the first objective of the Partnership and the importance of this action and of sustainable management of FSN sites are stressed in the Partnership Document (EAAFP constitution).

2. At their 6th Meeting, in March 2012, the EAAFP Partners adopted their Implementation Strategy 2012–2016. This included key result areas seeking that, by the 7th Meeting, an initial list of internationally important sites based on existing information be identified and communicated to Partners, and that initial guidance on the prioritisation of these sites for nomination to the FSN be developed and made available to Partners.

3. The present report describes the methods, results and conclusions of a 60 day consultancy project, commissioned by the EAAFP Secretariat in November 2012, to achieve these key result areas. The project consultant was supported and advised by a Reference Group, established and appointed by the Chief Executive, which was broadly representative of EAAFP membership, interests and expertise.

Overall approach

4. Sites must meet one or more of the EAAFP criteria for nomination to the FSN, so the overall approach for the project was to work within the framework of the criteria. Of the six criteria, four address waterbird count data. The criterion most often used by EAAFP, referring to site support of 1% of the size of a population of a migratory waterbird, was the primary basis for identification of candidate FSN sites for this project.

5. Consistent with Criterion a/6 of the FSN, data were collated at the level of waterbird population and only migratory populations were considered. Acting on a Partnership decision at its 6th Meeting, the consultant prepared an updated list of populations (256) and 1% thresholds for the East Asian – Australasian Flyway (the Flyway) for this project, based on the 5th edition of *Waterbird Population Estimates*. Past EAAFP practice was continued in compiling the list but it remains to be reviewed and endorsed by the Partnership.

6. Following the approach generally taken by EAAFP and predecessor initiatives for site networks in the Flyway, the project used the best available data and highest count of a population at a site. Consideration of average values, regular occurrence and weightings for survey coverage is not presently possible at whole-of-flyway scale.

7. Site names and implied boundaries in data sources were mostly accepted without alteration, relying on judgment of the original survey coordinators. Apart from obvious cases for consolidation where the same site had been surveyed by different organisations, minimal rationalisation of data into fewer sites was possible. Overlap exists among a few of the sites included, e.g. 'umbrella' sites and their component sites.

8. Count data were obtained principally from sources in the public domain, notably the Flyway's Anatidae and crane atlases (1999) and shorebird status overview (2008), supplemented by the analysis report of 20 years of the Asian Waterbird Census (2009) and the Red Data Book for Asia (2001). More recent data were secured from published articles, project reports and datasets of researchers and some national agencies, with emphasis on filling gaps in coverage. The project did not have resources to pay custodians for queries of major datasets of waterbird data, nor the time for a prolonged search of sources or for wide consultation.

9. In order to indicate the potential of the site to contribute to conservation, waterbird records up to about 30 years old (1982 onwards) generally were considered, even where changes in site condition or population size had subsequently occurred. Such changes were addressed in the project at a late stage of the prioritisation process. This broad approach to age of data was also dictated by atlas and overview sources accessed, because many of the internationally important sites in those sources were identified from data more than 15 years old. Younger data are not readily available for several countries in the Flyway.

10. The EAAFP Secretariat did not have a system for assembling and analysing data on waterbirds and lacked an integrated consistent list of candidate FSN sites. Therefore, a project-specific data management system was established using Excel spread-sheets.

11. The consultant produced detailed discussion papers addressing the overall approach to data collation and management and proposed methodology and criteria for prioritisation. These were reviewed by the project's Reference Group, leading to some enhancements.

12. Considerable detail on methodology, including rules and procedures followed for data management and for identification and prioritisation of sites, is provided in the report.

Identification of candidate sites

13. The project collated 3080 waterbird records from 21 countries, originating from 540 secondary or primary sources. No data were accessed for Laos. Each record represents a count of a waterbird population, which meets the 1% criterion for inclusion in the FSN (or the 0.25% FSN criterion where verified for some shorebird records) and thereby on its own could be the basis for nomination of the site to the FSN. Fifty sites were each identified as internationally important for 10 or more (up to 60) populations. Records for most of the 109 existing FSN sites were included, to apply latest 1% thresholds and for comparisons. Just over half of the records were for the 15 year period 1999 to 2013.

14. An integrated and updated list of existing and candidate FSN sites was produced and is available in formats arranged by waterbird population, or by country and site. It comprises 1060 sites of which about 950 are candidates for nomination. Thus, only about 10% of sites in the Flyway, which are known to be internationally important for migratory waterbirds, have been nominated to the FSN so far – potentially, the Network could be ten times larger.

15. Within the list, 179 waterbird populations are represented by at least one record; this includes 30 populations regarded by IUCN as threatened. The breakdown of populations by group is: 58 shorebirds; 55 Anatidae; 24 gulls and terns; 20 herons, ibises, spoonbills and storks; 12 cranes; 8 grebes, cormorants and pelicans; and 2 rails. Sixty-six of these populations have not been included in the designated FSN sites to date and therefore provide an opportunity to substantially broaden the scope of the Network.

16. Judgment was applied in assigning some records to the most appropriate population, where more than one population existed in the flyway for a particular species and population had not been specified by the source, e.g. Bean Goose *Anser fabalis* (5 populations); Common Redshank *Tringa totanus* (3 populations).

Prioritisation of candidate sites

17. Three criteria were designed specifically for the project and applied to the waterbird records, to obtain three separate prioritisations of candidate sites for nomination to the FSN. Partners may use the results separately, or combine as they see fit.

18. The first prioritisation criterion (PC1) was derived from the proportion of total size of population which had been recorded at the site, summed across all populations listed for the site in the project dataset, finally expressed as an index. The result for each site may be considered as a measure of the contribution that the site makes to conservation of migratory waterbirds in the flyway. It was necessary to set a ceiling of 100% on a small number of waterbird records where circumstances (e.g. changes to the 1% threshold) had created unworkably high scores.

19. The second criterion (PC2) was the number of populations at 1% (or in some cases 0.25%) level and the third (PC3) was the number of threatened populations (IUCN categories CR, EN or VU), listed for the site in the project dataset. PC1 proved to be the most useful and PC3 the least useful, for clearly separating sites in terms of prioritisation.

20. To remove possible records of vagrants, all 127 records of less than 10 birds were excluded before the three criteria were applied; this eliminated 51 sites and three populations from the prioritisation process. Then sites were sorted and ranked by score, for each criterion, and classes were applied country-by-country, with discretion according to circumstance. Class 1 was the top 10 sites (if the country had a large number of sites, otherwise top 5), Class 2 was the next 10 and in some cases Class 3 was also assigned. Sites already in the FSN were highlighted and sites known to no longer support some or most of the previous waterbird values were marked with text annotations.

21. Tables listing candidate sites, designated and undesignated to the FSN, in the top classes for each country, are provided in three appendixes to the report. Tables of the top site by criterion for each country (Table 6) and of the top five sites in the Flyway (Table 7) are in the body of the report. Sites now considered unlikely to be supporting high waterbird values, or where the rank may have been unduly influenced by problematic data, were excluded from these tables.

22. Table 6 includes 32 sites of which about half are coastal and half are inland wetlands. For each of 12 countries, one particular site features for two or more of the criteria, giving a clear top priority for future nomination to the FSN.

23. East Dongting Lake Nature Reserve (China) was the top-ranked undesignated site for the Flyway against all three criteria; other high-ranking sites in Tables 6 and 7 included Prek Toal (Cambodia) and Gulf of Martaban (Myanmar). Poyang Lake complex (China; a designated FSN site) was the site in the Flyway with highest index for PC1; South-East Gulf of Carpentaria (Australia; an undesignated site) was the highest-ranked site south of the equator.

Online access to the information

24. At conclusion of the project, it is anticipated that the consultancy products – this completion report, an extracted summary and two spread-sheets of data – will be uploaded to the EAAFP website www.eaaflyway.net . Most of the data was already in the public domain through not previously collated in one place. This upload should facilitate follow-up by Partners to review and use the lists of candidate sites and priority candidates in actively preparing new FSN nominations. Further discussions are needed within EAAFP to identify a workable mechanism for updating the information, including for tracking of progress achieved in expanding the FSN.

Conclusions and recommendations

25. NEW TOOLS As a result of EAAFP's investment in the project, the Partnership has two new tools to support strategic development of the FSN: an integrated and updated list of candidate sites; and guidance on prioritisation of nominations, country- by-country.

26. ROLE OF NOMINATOR These new tools provide guidance to EAAFP Partners on the relative contribution each site could make to maintaining populations of migratory waterbirds in the Flyway – but actual nominations are entirely at the discretion of the relevant Government Partner. The site boundary and data that justify inclusion in the FSN should be closely re-assessed in the process of preparing a nomination.

27. FURTHER DESIGNATIONS Partners are encouraged to use these tools to complete the designation of a significant number of sites to the FSN before the 8th Meeting of

Partners; countries with large numbers of candidate sites could aim for more than one designation. Partners are encouraged to give top priority to consideration of the highest-ranked sites as revealed by the present project and also of under-represented populations for which candidate sites have now been identified.

28. AWARENESS ACTIONS Recognising that only a portion of the 950 undesignated sites are likely to be added to the FSN in the next several years, Partners are also encouraged to use the list of candidates to promote greater awareness of internationally important wetlands, and their wise management, at national and flyway scales.

29. NEXT PHASE OF WORK In view of the resource and time constraints on the project and the inherent limitations of the information base for the project, it is recommended that EAAFP also consider the benefits of securing resources for a second phase of this initiative, for reporting to the 8th Meeting of Partners. This work may include: review and standardisation of site boundaries and names, and site mapping; improvement of problematic estimates for size of population; fresh queries of major datasets held by external custodians; and systematic filtering of data to account for major changes in site condition and long-term changes in use of sites by waterbirds. Alternatively or in conjunction, Partners should decide on possible adaptation of the Critical Site Network Tool for the Flyway in the near future, perhaps by commissioning a feasibility study.

30. ADDITIONAL APPROACHES Although first priority is for action on achieving new FSN designations, the Partners may also consider commissioning complementary approaches for prioritisation of sites in order to deal with populations or issues that could not be adequately addressed in the present project. This refers especially to waterbirds that are non-congregatory or otherwise not well represented in the FSN and bird families listed in the Partnership Document but not yet adequately defined at population level.

31. SUSTAINING THE INFORMATION BASE Of great urgency is the need to secure funds to enable flyway-scale databases on waterbird count data and site information to be adequately developed, managed, analysed and reported and to support ongoing coordination of regular surveys of migratory waterbirds.

1 Introduction

1.1 Importance of the Flyway Site Network

Paragraph 3 of the constitution of the Partnership for the East Asian – Australasian Flyway (EAAFP) (The Partnership Document: http://www.eaaflyway.net/partnership-document.php) states that establishment of the Flyway Site Network (FSN) is a critically important task of the Partnership. Development of the Flyway Network of sites of international importance for the conservation of migratory waterbirds is the first objective of EAAFP.

At the end of 2012, about 109 sites had been included in the FSN (http://www.eaaflyway.net/list-of-sites.php); overlap and change in status remain to be resolved for a few sites. Number of sites per country varied from 1 to 29, with four Government Partners (four countries) each nominating at least 10 FSN sites. Among the designated sites are wetlands widely regarded as some of the most important for waterbirds in the Flyway in terms of numbers of individual species and of all migratory waterbirds. Development of new nominations and existence of designated sites have catalysed considerable conservation-oriented activity, nationally and between countries.

1.2 Rationale, objectives and arrangements for the project

Whereas these facts show that collectively the Partners have demonstrated their commitment to building the FSN, it has also been generally acknowledged that much remains to be done. Some countries have nominated very few of the presumed candidate sites; sites have been focussed on just three of the many waterbird groups covered by EAAFP; many sites considered exceptionally important for migratory waterbirds are not yet included in the FSN; and the scope of inclusions has not necessarily been guided by a systematic framework.

In adopting their Implementation Strategy 2012-16 at the Sixth Meeting of Partners (MoP6, Palembang, Indonesia, 2012), the Partners requested a prioritisation of sites for inclusion in the FSN (Appendix 1). This would be initial guidance for release by the Seventh Meeting of Partners (MoP7), as part of a longer-term process (Key Result Areas 1.1 and 1.2). Essentially, the Partners were seeking new tools for development of their FSN.

Later in 2012, a project to start this process and create such tools was conceived and an individual consultant (the author) was appointed. Terms of reference for the consultancy are shown in this report at Appendix 2; from this, three broad objectives can be distilled:

- to *document* (identify) sites that qualify as being internationally important for migratory waterbirds in the East Asian – Australasian Flyway (EAAF)
- to *prioritise* those sites for nomination to the FSN
- to make this information widely *available*.

The scope and duration of the project were relatively constrained: funded consultant time was approximately 60 days, the project was to start in November 2012 and the main products were to be completed by 30 April 2013.

A Reference Group for the consultancy was formed by the Chief Executive of the EAAFP Secretariat. Its purpose was to provide guidance to the consultant on technical matters and to provide a first level of representation of the Partners' views on the FSN, recognising that there were diverse interests and opinions within EAAFP. Having involved the Reference Group closely in the project design and review of reports and products, EAAFP as a whole

would have established initial ownership of the outcomes. Several relevant experts were approached and Partners were invited to put forward members. The final composition (7 members) was broadly representative, including persons representing Government Partners (2 members), Intergovernmental Partners (2), International Non-government Organisations (3) and EAAFP Working Groups (5 or 6). Communication was by email and several experts who were colleagues of the members were included as alternates or additional advisors.

1.3 Project products and scope of this report

From the consultancy terms of reference (Appendix 2) and objectives listed above, four main products or tangible outcomes of the project were identified:

A. an integrated and updated list of candidate sites for nomination to the FSN
B. guidance on prioritisation of sites for nomination
C. appropriate elements of products A and B posted on the EAAFP website
D. a project summary report which would be circulated to Partners ahead of MoP7 and also presented and discussed further at MoP7.

It should be noted that, because of the existence of three separate site networks before EAAFP was established in 2006, and the short life of the EAAFP Secretariat, no integrated, comprehensive or up-to-date list of candidate sites had ever been prepared. Numbers and names of candidate sites had been mentioned but not formally presented, did not include other waterbird groups and had not been regularly reviewed. Product A therefore was the first of its kind.

In regard to product B, it is especially important to appreciate that the project would be a first step in EAAFP's initiative on this matter, would likely be just one of several possible ways of prioritising sites, would not affect any existing FSN designations, and would provide guidance rather than instruction. Nomination of sites to the FSN can only be done by the applicable Government Partner and use of the project products would be entirely at each Government Partner's discretion.

The present report aims to explain the methodology used in the project, present summaries of key findings from products A and B and give recommendations on next steps in the initiative. Relatively few remarks will be made about which sites should be nominated to the FSN as this is a matter for Government Partners to decide domestically.

It is hoped that the report and other products of this project will stimulate considerable interest and activity in further developing the FSN, as a step in taking the initiative to its next stages. Because many choices had to be made in developing the project methodology, further discussion is anticipated, but the author encourages users to focus on how EAAFP can use the project report and products to actively secure further conservation outcomes.

2 Overall approach

2.1 A quantitative approach: working with the FSN criteria

If a site is to be included in the FSN, it must meet at least one of the six criteria established by EAAFP for this purpose (see Appendix 3, derived from Partnership Document). Hence, the overall approach of the project was to work within the framework of the FSN criteria.

Of the six FSN criteria, four refer to numbers of waterbirds; another refers to threatened species without quantification; the sixth provides for exceptional circumstances. Providing a

meaningful basis for addressing threatened species is difficult without some quantification – in some cases, presence of a single bird may reflect a vagrant occurrence rather than frequent use of a site – but threatened species can be included by applying the numerical criteria. Since its formation, the EAAFP has emphasised use of FSN criterion a/6 (Appendix 3), which refers to the site supporting 1% of the estimated size of a waterbird population, in development of new FSN nominations. This approach acknowledges that FSN criterion a/6 has considerable ecological meaning and that the two criteria based on total numbers of waterbirds are far more arbitrary and much less meaningful from a conservation perspective. In practice, most site nominations for the FSN have relied on criterion a/6.

Overall, this means that the project took a quantitative approach, which depended on availability of count data that were suitable to meet the project objectives.

2.2 Working at the population level

Consistent with FSN criterion a/6, the project worked at the level of the waterbird population and data were collated accordingly. Within a flyway, a particular species may have several populations, defined by subspecies and/or geographically separate groups. A population may be defined as a potentially interbreeding group of animals that occupy a given locality; the interchange of individuals between populations remains at a low level (Wetlands International 2006, p. 7). The population is the most appropriate unit for conservation management at flyway scale.

In practice, this approach sometimes presented challenges in assigning count data to the appropriate population, e.g. where birds were identified to species level but not population level (see below). However, the author – supported by the Reference Group – considered working at the population level to be the most appropriate approach in the context of successful conservation and management of waterbird populations in the Flyway. Increasingly, national governments and international mechanisms are working at the population level and guidance and colour-marking is being developed to enable recognition of many populations in the field.

The list of populations presently occurring in the Flyway is discussed below.

2.3 Only migratory populations were considered

In keeping with the FSN criteria (Appendix 3) and the goal of the Partnership, only migratory populations were considered in the project. Appendix II of the EAAFP Partnership Document makes clear that a population is migratory if a significant proportion of [its] members cyclically and predictably crosses one or more national jurisdictional boundaries. Populations that remain within the boundaries of one country require less or no international cooperation; they may be conserved adequately through domestic-level actions and thus are not normally included in the international cooperation work of EAAFP.

This approach is reflected in the list of populations endorsed by the Partners at their Second Meeting of Partners, which until now has been the official reference list for developing FSN nominations. This and subsequent lists (see below) have been based on the global database *Waterbird Population Estimates* managed by Wetlands International on behalf of the Ramsar Convention on Wetlands, especially for establishing 1% of population size.

2.4 Consideration of all migratory populations

In keeping with the holistic approach to flyway conservation, which was a driving principle in formation of the Partnership in 2006, the project attempted to address all populations of migratory waterbirds in the flyway. Before 2006 and to a large extent in the FSN designations from 2006 to present, emphasis had been on three waterbird groups: Anatidae, cranes and shorebirds. A key principle of the project approach therefore was to ensure that, definitions and data permitting, all other waterbird families and groups would be considered in identifying sites that are internationally important for migratory waterbirds. This could mean inclusion of waterbirds such as herons and/or terns in existing or future FSN designations and potentially some sites being nominated only on the basis of these other waterbirds.

It is, however, well known that site networks based on waterbird counts do not adequately address certain waterbird species such as those that do not normally congregate, that congregate at very few sites (which may be missed), that inhabit unsurveyed habitats such as grasslands at some stage of their life cycle, and/or that are rare, inconspicuous or difficult to identify. Complementary mechanisms may be needed to address conservation and international cooperation for such species. Nevertheless, recognition or protection of a site that is identified as important for certain species will often benefit a much wider suite of species that also occur at the site.

It should be noted that certain bird families such as Procellariidae (shearwaters) and Alcidae (auks) are included in Appendix III of the EAAFP Partnership Document but not under the list of waterbirds of the Ramsar Convention on Wetlands. Definition of populations and estimates of population size within the EAAF have not been formally developed for such families, a key requirement for the present project (see below); hence these families could not be included in the project.

2.5 Use of best available data and highest number counted

Following the approach taken by EAAFP and predecessor initiatives in this flyway, the *best available* data and highest count of a population at a site, were used for the project.

Ideally, count data for each population from each site in the flyway would cover all (or at least, many) years and the main seasons of migration, and include information on observer effort and site coverage. The great majority of count data for waterbirds in the EAAF have been collected by volunteers and whereas it is clear that much of that work has been closely supervised by competent experts/organisations, those parameters have not been widely met. For some sites in remote areas, only one or a few surveys have been conducted. Even where good series of surveys existed, it was beyond the scope and timeframe of the project to conduct comprehensive analyses of such data to derive mean count values.

Therefore, for exercises such as the present project, consideration of average/mean values from counts, of weightings to account for observer competence and of scale factors to account for extent of site coverage cannot be attempted consistently at the flyway scale. The concept of ‘regular occurrence’, though included in some of the FSN criteria, is rarely possible to apply. Instead, the project has followed the guidance provided by Ramsar (Ramsar Convention 2013: pp. 88-89) in accepting count data from one-off or infrequent surveys where regular survey series’ do not exist.

Furthermore, the present project has used the highest number counted of a population at a site, as its primary information. Again, this follows the approach generally taken by EAAFP

and predecessor initiatives. Although this may overstate the number of individuals that frequently occur at a site, it nevertheless indicates the maximum potential of the site and thus is useful data, especially for the objectives of the present project. (Average numbers may be more important for other purposes such as development of site management plans.)

The project provides guidance to Partners. In preparing a site nomination for the FSN, the applicable Partner Government is encouraged to critically review the original count data, secure any more recent data and make its own decision on which information will provide the justification for the nomination.

2.6 Using count data that were readily available

There is no consistent, ongoing survey program of waterbirds spanning the entire EAAF and all migration seasons, although the Asian Waterbird Census (AWC) (Li *et al*. 2009) addresses many aspects of this ideal scenario. Waterbirds have been counted by some government conservation or research agencies, by national and local organisations and by individual researchers for different purposes and at various scales and frequencies. Original (primary) data sets are held by such custodians under restricted access, open access and other arrangements. Accordingly, collation of waterbird count data for the flyway in a consistent and systematic manner is an inherently difficult and time-consuming task.

Ideally, the project would have queried primary datasets of the AWC and regional, national and private custodians, to identify internationally important sites according to the FSN criteria. However, it became clear early in the project that most custodians would require dedicated new funding to pay for the time of personnel to conduct such queries and that some query work may take many months [1]. Unfortunately, the project had neither the financial resources nor sufficient time and a decision was made to limit data sources to those in the public domain or otherwise readily obtainable at no cost. Future stages of the initiative could potentially pursue other approaches (see the project recommendations, below).

Fortunately, atlases or overview summaries were developed by the coordinators of the separate site networks that predated EAAFP and these secondary sources provided a convenient head start to identifying important sites and/or collating count data (Chan 1999; Miyabayashi & Mundkur 1999; Bamford *et al*. 2008). These foundations were built on by accessing the analysis of 20 years of the AWC (Li *et al*. 2009), details for some threatened species in the Red List of threatened species in Asia (BirdLife International 2001) and more recent data from reports, datasets and published articles of Partner/other organisations, individual researchers and some national agencies. Indeed, it seemed likely that these sources would be sufficient to identify the majority of sites that are internationally important for multiple species and thus likely to rank highest in a prioritisation exercise.

2.7 Definition of site names and boundaries

Given the many unrelated efforts to count waterbirds in the EAAF, it should not be surprising that there is no single list of sites and their names, nor description or mapping of site boundaries, which applies flyway-wide. This has been addressed to some extent by the AWC but its coverage is incomplete; for example, as the AWC is a 'mid-winter' census, it therefore excludes 'frozen' regions in Russia, USA (Alaska) and northernmost parts of five other flyway countries. Additionally, the project timeframe did not permit a comprehensive

[1] Also, some sources included waterbird records on the basis of previous 1% thresholds, now superseded (see below); thus, a fresh query of the original data was desirable – but was not possible.

review of thousands of sites and their boundaries by working with national coordinators and individual researchers.

Consequently, it was necessary to rely on the judgement of original coordinators of surveys in accepting their site names and implied boundaries, recognising that in many if not most cases the boundaries of sites did not overlap and were ecologically meaningful. Product A would thus present information against site names as extracted from the accessed data sources. It was likely to include a small proportion of duplicate or overlapping sites.

Where sites identified under unrelated survey programs did clearly overlap, the consultant's approach was to address this at secondary stages of the project (see below). Entries at the earliest stage would be left in their original form whereas waterbird records would be rationalised under new or combined site names at a later stage of the work. Product B would thus include very few duplicate or overlapping sites.

- In areas under intense and ongoing development pressure, it may be better to retain smaller survey sites because nomination and/or protection of these disappearing sites may be feasible only at the smaller-site scale.
- Also, definition of sites may also relate somewhat to the scale at which a country chooses to conduct surveys and manage habitats, e.g. smaller sites, closer together in smaller countries but bigger and widely-spaced sites in larger countries.

Coordinates of sites were extracted from the source of the waterbird record where possible. If no coordinates were given, internet search tools (GetAMap, Google Maps, Mapcarta, Google Search) were used to secure matching details. However, in some cases no coordinates could be found and coordinates were marked as 'MISSING'.

Time constraints prevented conduct of a flyway-wide verification of all site coordinates, including consultation in each country. In any case, point coordinates are of limited use in defining a site whereas a GIS shapefile defining the entire boundary would provide the best site definition.

Clearly, it would benefit development of the FSN if the definition, naming and mapping of sites could be improved. The report provides recommendations (below) on future work.

2.8 Age of the waterbird records

In order to indicate the potential of a site to contribute to conservation, waterbird records (highest recorded count of each population) up to about 30 years old, from about 1982 to present, were considered for the project. This was partly dictated by use before 2006 of some records of considerable age in forming the earliest designations to the FSN, which were later reflected in the Anatidae, crane and shorebird atlases/overviews [2]. In order to achieve a more contemporary assessment, time and funds would need to be allocated for a fresh query of all original datasets, setting a younger age limit.

It was considered impractical to define a single, recent cut-off date for waterbird records for this project. In many cases, highest counts from surveys conducted more than 20 years ago would have been equally applicable under present site conditions. However, where it was well known that changes in site condition had occurred after the date of a criterion-meeting record, such changes were addressed in the project at late stages of the prioritisation process (see below).

[2] Later sections of the report provide more information about the age of data actually accessed.

The project provides guidance to Partners. In preparing a site nomination for the FSN, the applicable Partner Government is encouraged to critically review the original count data, secure any more recent data and make its own decision on which information will form the justification for the nomination.

2.9 Flexibility of the prioritisation approach and subsequent use

Whereas the identification of candidate sites for the FSN is somewhat dictated by the terms of the FSN criteria, the prioritisation process is not so constrained. Methods and criteria for prioritisation could be at the discretion of the consultant and advisors, providing the opportunity to exclude/filter data that might reduce the meaningfulness of outcomes. Nevertheless, there would be benefits in retaining an approach to prioritisation that would be in close harmony with the FSN criteria; this is discussed in detail below.

Partners may use the prioritisation (project product B) in various ways to suit their needs. For example, it may be valuable in enabling a Partner to measure the relative benefit of its investment in conservation or restoration of a particular site.

2.10 Review by the Reference Group

An outline of the consultant's overall approach was included in the bid proposal accepted by EAAFP and the project's Reference Group therefore largely worked in that context. Discussion papers [3] on technical issues for data collation and management (13 pp.) and the consultant's proposed prioritisation methods & criteria (16 pp.) were circulated among the Reference Group and many helpful improvements were fed back and mostly incorporated.

This review process also brought forward some points that were outside the scope of the project and/or the accepted bid proposal. Such points included further definition of the families, populations and population size estimates of oceanic seabirds to be included under EAAFP and substantially different, overall approaches to prioritisation of sites. The majority of Reference Group members agreed that those matters should be discussed separately by the Partnership (e.g. at MoP7) and/or included in recommendations for complementary work arising from the present project.

2.11 Other considerations

- Data for existing FSN sites were included in the project because:
    - this would reveal how well the existing Network represents waterbird populations in the Flyway
    - a compilation of criteria-meeting records across all sites did not exist
    - Site Information Sheets were missing for some FSN sites and/or the key section on justification of criteria met had not been written.
- Partners would have opportunity to use the data generated by the project for additional purposes such as more detailed or species-oriented analyses, or analyses using alternative methods.
- In principle, updating of Products A and B from the project would be possible, by the EAAFP Secretariat (for the whole flyway) and/or individual Partners (for a single country, region or other focus).

[3] Copies of the Discussion papers may be requested from the Chief Executive.

3 Identification and documentation of candidate sites

This section of the report describes the methods and results for documentation and identification of candidate sites for the FSN, the main outcome of which is product A, the integrated and updated list of candidate sites. Data for existing FSN sites are included. Sub-sections give details on key issues.

3.1 A data management system for the project

When the project started, the EAAFP Secretariat lacked an integrated and comprehensive list of candidate FSN sites and had no systematic arrangement for assembling and analysing data on waterbirds and sites. A data management system therefore had to be established specifically for this project.

The project timeframe was insufficient to commission development of a sophisticated customised database so a simple system using Microsoft Excel spread-sheets was devised by the consultant. This had the advantages of being able to be readily understood, manipulated and updated by most if not all Partners, yet with potential to be transferred to a more powerful, purpose built system in the future.

One spreadsheet (File 1) was established to collate waterbird records that met the FSN criteria, with those records being sorted in other worksheets of the same file, to present results by site. These worksheets were supported by three key reference sheets.

File 1: An integrated and updated list of candidate sites for the Flyway Site Network

- Sheet 10: metadata
- Sheet 11: waterbird records, in raw form
- Sheet 12: as sheet 11 but arranged by site
- Sheet 13: as sheet 12 but with minor (obvious) rationalisation of sites
- Sheet 14: reference list of populations and thresholds
- Sheet 15: reference list of site details (coordinates, etc.)
- Sheet 16: reference list of data sources.

A second spreadsheet (File 2) was created to perform the prioritisation, starting with a copy of Sheet 13 and including the same three reference lists. Details are given below.

It is important to note that each waterbird record in the updated list represents a basis, on its own, for potential nomination of the relevant site to the FSN. Government Partners should always check and review each waterbird record before making a nomination.

At first, the consultant explored the possibility that the project's data management system could be successfully linked to the International Waterbird Census of Wetlands International (which is linked to the AWC), and perhaps other ongoing datasets, to enable 'live' updates of waterbird data. However, this idea proved to be premature. Instead, some members of the Reference Group advocated keeping the present arrangements simple, with limited investment, given the greater benefits to arise from possible future adaptation of the Critical Site Network Tool (Wings Over Wetlands 2013) for the EAAF, if not globally.

3.2 A new list of waterbird populations and 1% thresholds for the project

At the Second Meeting of Partners, held in 2007, a list of waterbird populations with corresponding population estimates and 1% thresholds was endorsed by EAAFP for use in preparing nominations to the FSN. This 'MoP2 List' was based on the Fourth Edition of Waterbird Population Estimates (WPE4: Wetlands International 2006). It has been available on the EAAFP website for more than four years and has guided recent FSN nominations.

The Fifth Edition of Waterbird Population Estimates (WPE5: Wetlands International 2013), containing many revisions and updates and established online as an interactive tool, was endorsed by the Ramsar Convention in 2012. At MoP6, also in 2012, the EAAFP also agreed to use the data in WPE5 (Agenda 4.3.1; Meeting Report, Action 25), to update the flyway population estimates used by EAAFP to identify candidate Network sites.

This transition to WPE5 data had not occurred by the start of the present project in November 2013. Therefore the consultant needed to update the list of waterbird populations and 1% thresholds for the project, based on WPE5. The new list would need endorsement of the Partnership before becoming its official replacement for the MoP2 List; thus it was to remain a draft list, to be used for project purposes only, at least until MoP7.

Principles and practices followed in preparing the new list included:

- all 256 migratory populations recognised by WPE5 for the EAA Flyway were adopted
- as done for the MoP2 List, where an estimate of population size was expressed as a range (e.g. minimum estimate 10,000; maximum estimate 100,000), the 1% threshold was based on the minimum estimate
- as the project was using a quantitative approach to identifying important sites for as many populations as possible, it was desirable to establish a numerical threshold for all populations that had population estimates – in other words, numbers were needed in order to collate waterbird records, to form a set of sites to work on, for our special purpose task of prioritising
- if the calculated 1% threshold was less than 1.0, it was rounded up to 1 bird
- populations not included in WPE5 would not be included in the present project (see notes above about several bird families covered under EAAFP but that could not be included in the project).

The new list created for the present project is in Appendix 4. Significant differences between the MoP2 List and the project list included:

- a net increase (7) in number of populations
    - this was largely caused by subdivision of several populations of Anatidae, notably Bean Goose *Anser fabalis* (an increase from 2 to 5 populations) and Greater White-fronted Goose *A. albifrons* (from 1 to 3 populations).
- A net increase (2) in number of threatened populations (CR, EN, VU) to 33
    - Some populations were omitted (e.g. Spot-billed Pelican *Pelecanus philippensis*); others were added (e.g. Great Knot *Calidris tenuirostris*)
- an increase in 1% threshold for 13 populations (Table 1)
    - example: Eurasian Curlew *Numenius arquata* (from 350 to 1000 birds)
    - for this project, some sites now did not meet the 1% threshold for such populations and affected records at such sites were excluded (see below)
    - NOTE: in terms of designated FSN sites, EAAFP has followed a practice of not deleting sites from the FSN unless the applicable Government Partner chose to do that.
- a decrease in 1% threshold for 29 populations (Table 1)
    - example: Far Eastern Curlew *N. madagascariensis* (from 380 to 320 birds)

- for these populations, original datasets could be re-queried in the likelihood that additional candidate sites would be identified, but in practice this was not logistically possible (see above)

Table 1. Waterbird populations for which the 1% threshold increased or decreased between the MoP2 List and the list developed for the present project

A. 1% threshold decreased	B. 1% threshold increased
Cattle Egret, Australia	Black-faced Spoonbill
Australian White Ibis	Lesser White-fronted Goose
Emperor Goose	Falcated Duck
Mandarin Duck, Korea	Steller's Eider
Baer's Pochard	Scaly-sided Merganser
White-naped Crane, China	Siberian Crane
Common Crane, S China	Pied Avocet
Hooded Crane, C China	Oriental Plover
Red-crowned Crane, E China	Eurasian Curlew
Eurasian Oystercatcher	Grey-tailed Tattler
White-headed Stilt	Broad-billed Sandpiper
Australian Pratincole	Common Tern, longipennis
Grey Plover	White-winged Tern
Lesser Sand Plover, stegmanni	
Lesser Sand Plover, mongolus	
Greater Sand Plover	
Black-tailed Godwit	
Bar-tailed Godwit, menzbieri	
Bar-tailed Godwit, baueri	
Far Eastern Curlew	
Spotted Greenshank	
Ruddy Turnstone	
Great Knot	
Curlew Sandpiper	
Rock Sandpiper	
Dunlin, arcticola	
Spoon-billed Sandpiper	
Little Tern, placens	
Aleutian Tern	

The MoP2 List was based on the 4th Edition of Waterbird Population Estimates (WPE4) whereas the project list is based on the 5th Edition (WPE5). Data for all editions may be viewed online at: http://wpe.wetlands.org/search by filtering for 'EAAF Partnership', then double-clicking on the relevant population name.

Population names may be abbreviated; refer to Appendix 4 for full details of population names.

- the 1% threshold was calculated as a value less than 10 for each of 24 populations
  - example: Painted Stork *Mycteria leucocephala*; Long-billed Plover *Charadrius placidus*
  - the MoP2 List preferred to avoid numerical 1% thresholds where such thresholds would be very low, inserting the advice "case basis" instead

    - in the new list, many of these low values arose from cases where the new minimum population estimate was just 1 bird (e.g. a range of 1 to 10,000 birds, previously stated as “less than 10,000 birds”)
- note that the data in Table 1 do not include populations that were new to the list, were split, or had no previous estimate and/or 1% threshold
- in most cases the changes were due to improved knowledge; in a few cases the changes were due to a correction of the previous assessment
- in some cases, WPE5 introduced geometric means and rounding off in deriving 1% thresholds but those practices were not applied in producing the project list.

Unfortunately, the new list, like its predecessors, is far from perfect because estimates are not yet available for 27 of the EAAF’s 256 defined populations – nor for several other Families included under EAAFP (see above) – and a few estimates may need review and improvement. Of greatest concern for the present project (see below) is the situation where a population seems to be rapidly declining (e.g. Baer’s Pochard *Aythya baeri*), with a consequence that many counts dated as little as 10 years ago are now well above even the latest published estimate of total size of population. This applies to only a few populations.

The project methodology depended on a reliable and contemporary list of 1% thresholds. Despite some limitations, the consultant and Reference Group in majority considered the new list was sufficiently robust to address the project’s objectives.

The project list (Appendix 4) included an update of the populations that presently are considered by IUCN to be threatened, i.e. Critically Endangered, Endangered or Vulnerable.

3.3 Rules and procedures for collating and organising data (candidate sites)

As waterbird records were collated and organised in order to meet the first objective of the project and derive an integrated and updated list of candidate FSN sites, certain rules and procedures were applied. These are summarised in the following points.

- **Testing against FSN criterion a/6 (1% of Flyway population):**
    - Records meeting the 1% threshold for the applicable population, as defined in the project’s list of populations and thresholds (Appendix 4 and sheet 14 in File 1 of the data management system), were accepted.
    - Due to recent changes in some 1% thresholds (Table 1, column B) and/or inconsistent use of thresholds at time of nomination, some records previously used in site nominations were omitted from the project.
        - This does not affect existing FSN site designations.
        - Time and funding did not permit querying of original data sets to identify records that, due to a decrease in 1% threshold (Table 1, Column A), now met criterion a/6. This is a task for a possible future stage of the initiative.
    - This criterion was the primary test for inclusion of waterbird records in the project (see subsequent points, below).

- **Testing against FSN criterion b/i (0.25% of Flyway population):**
    - Records meeting the 0.25% (staging) threshold for the applicable population, as defined in the project’s list of populations and thresholds (one quarter of the 1% threshold), were accepted.
    - It is often difficult to apply this criterion because the observer/coordinator must be confident that the birds were in the process of passing through (staging at) the site – hence this criterion has not been widely used in past FSN nominations.

        - It is not necessarily sufficient that a population occurred at the site at a date consistent with migration activity, e.g. April.
        - If some of the population normally occurred, or was likely to occur, at the site in the non-breeding period, this criterion typically would not be applied.
    - As time did not permit querying of the numerous original observers/coordinators or review of the circumstances at each site, only records that had previously been systematically scrutinised for this purpose were accepted.
        - Consequently, only those records meeting the 0.25% threshold as included in the Status Overview of Shorebirds as summarised by Bamford *et al.* (2008), were accepted for this project.
    - Where changes in 1% threshold meant that a previously accepted record now fell below 1% but still met 0.25%, the procedure outlined in the previous point was applied.
        - 11 records of shorebirds, included in Bamford *et al.* (2008) as meeting 1% were omitted from the present project after consultation with a co-author of that publication to confirm that staging was not applicable.
        - Affected records were: Common Greenshank (3), Common Sandpiper (3), Eurasian Curlew (4) and Pied Avocet (1). One per cent thresholds for the latter two populations increased from a few hundred to 1000 birds.

- **Testing against FSN criterion a/2 (threatened species occurs at site):**
    - In accordance with the wording of this criterion (Appendix 3), only species that are vulnerable, endangered, or critically endangered can be considered.
    - The criterion wording provides no quantitative or qualitative instruction regarding occurrence of a threatened species at a site. Thus, records of a single bird could potentially be acceptable yet may reflect only vagrant occurrence.
    - Threatened species are captured under the 1% and 0.25% criteria. Thus, records of threatened species for the project were not included separately to those criteria, to eliminate records that probably were not ecologically meaningful, e.g. likely records of vagrants.
    - Applying a 0.1% threshold was considered for criterion a/2 but was disregarded because potentially it would only increase the number of vagrant records.
    - After viewing the project results, if EAAFP seeks greater representation of threatened species then a complementary approach should be pursued.

- **Testing against other FSN criteria:**
    - Criteria a/5 and b/ii (Appendix 3) refer to total number of birds at a site.
        - Whereas potentially a site may be included in the FSN solely on the basis of either of these criteria, in practice no designation has occurred solely under a/5 or b/ii.
        - Unlike data on waterbird records (highest count), data on total numbers have not been substantially collated into secondary data sources for sites in the EAAF. Neither have such data been prepared systematically across the flyway. Time did not permit scrutiny of original datasets.
        - Criteria a/5 and b/ii bear no reference to particular waterbird populations and thus do not necessarily broaden the scope of populations that would be included under the FSN.
        - Criteria a/5 and b/ii are less meaningful ecologically than criteria related to percentage of population size.
        - Therefore, these criteria were not used in the project.
    - Criterion c is for exceptional circumstances and thus is not appropriate for the present exercise. It has not been used in existing FSN designations.

- **Review of the date of the record:**
    - See the earlier section for explanation on dealing with age of the record.
        - Records up to about 30 years old were accepted because many existing FSN site designations are based on or include records of (up to) that age.
    - Records older than about 30 years (pre-1982) normally were excluded.
        - This rule recognises that the quality of many sites has deteriorated and that many populations have declined
        - Also, that occurrence of birds at 1960s or 1970s levels is no longer valid at some sites.
        - Thus, a realistic cut-off date seemed necessary.
        - A small number of older records was included: see results section, below.
    - For the purpose of compiling an updated list of candidate FSN sites, waterbird records (that passed the FSN criteria tests, above) 30 years old or younger were included despite knowledge that some sites have deteriorated inside this period.
        - This approach allowed the full known potential of sites, in terms of support for various waterbird populations, to be captured. Degraded sites may sometimes be restored to their former capacity.
        - Whereas it might be desirable to apply a shorter period of acceptable dates (e.g. 10 or 15 years), the scope and nature of the various data sources accessed for the project (see above) meant that a short time span would eliminate a very large number of waterbird records.
        - Many of the secondary sources provided only the highest number counted, within a period of about 30 years.
        - Project resources and timeframe did not allow review of change in condition at every candidate site, nor querying of original datasets to find highest number counted, of each population, in a specified shorter period such as 10 or 15 years. These may be important tasks for a future stage of the initiative.
        - The project results provide guidance. Ultimately, the Government Partner should review the results from this project, especially the included waterbird records for the site it is considering, and make its own decision as to whether or not certain records can be used to robustly support its new site nomination.
    - In some cases, records without a specified date were accessed from sources such as the Anatidae or Crane Atlases. As the site had been recognised as being internationally important in these publications, such records were included in the project, provided they passed the FSN criteria tests, especially if there were no dated records (of other waterbird populations) that caused that site to be included in the project data management system.

- **Procedure where other basic elements of the record were missing:**
    - In a small number of cases, records were detected in secondary sources such as the Site Information Sheet of a designated FSN site, or one of the Atlases, where no count data were included.
        - As inclusion in such sources indicated or implied that the site had previously been identified as being internationally important for the applicable waterbird population, it seemed necessary to find a way to incorporate such records.
        - For the purpose of forming the integrated and updated list of candidate FSN sites, such records were included for threatened species, but were listed separately at the end of the compilation (see File 1, Sheets 11, 12 and 13).
            - In practice, 53 such records were included, comprising 22 populations

        - records of each of these populations from other sites were included in the main list.
      - These records were excluded from the prioritisation stage (see below) as that required numerical analysis of count data.
      - In considering nomination of the applicable sites, Partners may succeed in filling these information gaps.
    - Most other waterbird records that lacked count data were excluded.
      - Records of Anatidae and cranes from some sites, mainly from breeding areas in Russia and Mongolia and documented in the Atlases, were thereby excluded.
        - The Crane Atlas (Chan 1999) did not include count data but most of the applicable records therein were substituted by records from other sources, such as the Red List for Asia (BirdLife International 2001), which provided the necessary count data.
  - Some records, such as those gleaned from Site Information Sheets, lacked information on the primary source of the count data. Though not ideal, this seemed insufficient grounds to exclude such records.

- **Procedures for dealing with an unknown population:**
  - Thirty-six species occur in the EAAF as more than one population (Appendix 4); this affects the herons (6 species, 13 populations), Anatidae (5, 15), cranes (5, 10), rails (3, 6), shorebirds (7, 19) and gulls/terns (10, 26). Of these 89 populations, there are no size estimates for 10 and thus they are excluded from the project. The remaining 79 populations present a special challenge to the project and more broadly to development of the FSN, because waterbird counts must be assigned to the correct population, wherever possible.
    - These populations are largely identified because of sub-speciation (e.g. the 4 subspecies of Lesser Sand Plover *Charadrius mongolus*) or occupation of separate geographical areas outside the breeding season (e.g. the three populations of Mandarin Duck *Aix galericulata*, visiting China, Korea and Japan).
    - Most of the affected herons, Anatidae and cranes occur in separate areas during the non-breeding period; Bean Goose is a notable exception.
    - Unfortunately, most of the subspecies (within the 79 populations) are difficult or impossible to identify in the field (e.g. the 3 subspecies of Common Redshank *Tringa totanus*) and many populations of the relevant shorebirds and gulls/terns occur together at some sites during migration (e.g. 2 populations of Red Knot *Calidris canutus*) and/or in a few cases on the non-breeding grounds (e.g. 2 populations of Herring Gull *Larus argentatus*).
  - In the context of project timeframe and resources preventing an exhaustive investigation of original data, the project adopted the following approach to assigning the best-fitting population, where the population had not been specified:
    - Where geographical location clearly suggested a particular population (e.g. Hooded Crane *Grus monacha* in Japan), that population was assigned to the record and the corresponding 1% threshold was applied.
      - This procedure could not be applied confidently in much of the migration and breeding areas for such species, notably in northern China, Russia and Mongolia; see procedures below.
    - Where it was impossible to assign a population, the label “unknown population” was affixed to the species’ name and the combined 1% threshold (for all populations of the species in the Flyway) was applied.

- Commonly occurring examples were Common Redshank and Dunlin *Calidris alpina*; to a lesser extent, Little Ringed Plover *Charadius dubius* and Little Tern *Sterna albifrons* at sites in South-East Asia.
    - For species such as Common Redshank and Dunlin, this method of assignment has largely been used in the past.
- Under better circumstances, a more sophisticated approach might be followed where we assign the population that was statistically most prevalent in that location or region.
- An impact of assigning a combined 1% threshold was that certain records might thereby be excluded, because 'the bar is higher'.

- Where it was possible to assign the record to two or more, but not all, of the Flyway's populations of the relevant species, the label "unknown population" was affixed to the species' name and the combined 1% threshold for the applicable populations of the species in the Flyway was applied.
    - In the case of Bean Goose, if the population had not been identified, the following allocations were made:
        - For records in Japan, assign combined data for populations 61 and 64 (code refers to row in sheet 14: see below).
        - For records in Korea, assign combined data for populations 62 and 65.
        - For records in China and Mongolia, assign combined data for populations 62, 63 and 65.
        - For records in Russia, assign combined data for all 5 populations unless, clearly, fewer populations applied (e.g. in Kamchatka).

            61 = middendorffi, Okhotsk/Kamchatka-Japan
            62 = middendorffi, Yakutia/E Asia
            63 = middendorffi, Sayan/E China
            64 = serrirostris, Kamchatka/Japan
            65 = serrirostris: Central & Eastern Siberia
    - In the case of Lesser Sand Plover, if the population had not been identified, the following allocations were made:
        - Records were assigned to a single population where possible (Bangladesh & Myanmar = *atrifrons*; Japan and Kamchatka = *stegmanni.*)
        - Records for Thailand, Malaysia and western Indonesia were assigned to a combination of *atrifrons* and *schaeferi*.
        - Records for China, Korea, Philippines, eastern Indonesia and Australia were assigned to a combination of *mongolus* and *stegmanni*.
        - Russian sites were assigned to *mongolus* and *stegmanni* (eastern) or *mongolus* and *schaeferi* (Dauria region).
- Where a known population and an unknown population each met the respective 1% threshold at a site, the record with the largest count was retained and the maximum numbers of the other population/s at the same site were noted in the 'Comments' field for the record.
    - This occurred in a small number of records (probably less than 20) for Bean Goose in Japan and Korea.
- Where there was no estimate and thus no 1% threshold for one of the possible populations, discretion was applied case-by-case.
    - Example: for Herring Gull, an estimate exists for population *mongolicus* (57,000 to 60,000) but not for *vegae* which is known to

be abundant; thus unless the population was identified, the record was not used for this project.
- Example: for Gull-billed Tern *Sterna nilotica*, an estimate exists for population *addenda* (10,000 to 100,000) but not for *affinis*, however *affinis* is poorly known and assumed at this stage to not be abundant; thus the 1% threshold for *addenda* was applied to unknown populations of this species, for this project.

- Where location was at the edge of the flyway (Bangladesh, Mongolia), some discretion was used to assign the best-fitting population.
  - If likely that the population of another flyway applied at the site, then the record was excluded, e.g. in Bangladesh, Black-tailed Godwit *Limosa limosa* and several other species also occurring in substantial numbers in the Central Asian Flyway.
    - The knowledge of many populations is inadequate to accurately address these 'flyway-boundary' issues.
    - The usual approach taken in the project was to exclude records from Bangladesh of a species that had a population marked in WPE5 as occurring in South Asia (and not listed as occurring in EAAF: Appendix 4), as well as a separate population occurring in South-East Asia. It was assumed, therefore that records of species such as Great Cormorant *Phalacrocorax carbo* in Bangladesh were not applicable to the EAAF.
    - For Bangladesh, due to these uncertainties a relatively small number of records of several populations may have been excluded or included inappropriately and should be reviewed in a future stage of the project
- Where a single population is considered to occur across both the EAAF and the Central Asian Flyway, no attempt was made to split the estimate or 1% threshold between the flyways:
  - e.g. Brown-headed Gull *Larus brunnicephalus* and Lesser Sand Plover, *atrifrons*
    - The latter example differs from Bamford *et al*. (2008).
    - Ideally, splitting of estimates between flyways in such cases would be systematically calculated from raw data.

- **Procedures for site names and boundaries:**
  - In worksheets 11 (Waterbird records) and 12 (Arranged by site - 1) of the project's File 1 (integrated and updated list of candidate FSN sites), the site name for each record, obtained from the data source, was largely left unchanged.
    - See earlier remarks on overall approach, above.
    - Sites with similar names but vastly different coordinates were retained as separate sites.
    - Having retained the original name of the site, which may also imply certain boundaries to the area covered in the count, Partners and experts may be able to track down the primary data and most easily review the record, if using it to prepare a new FSN site nomination.
      - It is important to recognise that the area covered in a survey and thus the count data arising, may or may not match well to existing land tenure or geography (e.g. a protected area or one wetland).
    - Government Partners are encouraged to review the data in these worksheets, as well as the original data, to make their own decisions about combining or splitting sites, before making nominations.

- In worksheet 13 (Arranged by site – 2), some rationalisation of sites was performed, as described below:
  - Where records obviously applied to the same site but a slightly different name (by spelling, or non-English) was used by different sources (e.g. Anatidae vs shorebird overviews), then a single name, often expanded to include the other variations used, was applied
    - Such changes were replicated in worksheet 15 (Site details)
    - Examples: Kum & Geum; Huang He & Yellow River.
  - No systematic effort was made across all the data to amalgamate sites in close vicinity or with contiguous habitat.
    - Such a task would have required comprehensive knowledge of the area covered in each survey, which was not available and would have required a lengthy inquiry.
    - Separation of sites in many cases undoubtedly reflected the considered judgments of observers/coordinators of surveys.
    - Differences in land/water tenure may support the practice of keeping sites separate, especially where separate land parcels are administered by unrelated agencies/owners.
    - A few contiguous and ecologically coherent sites were amalgamated, especially where that had already been done by some sources, Examples: Deep Bay (includes Mai Po & Futien); and the Poyang Lake complex.
  - Sites that covered a large area and included several separately-recognised sites, were retained.
    - Usually it was not possible to split data – that would have required access to original survey data – or match data confidently to the component sites.
    - Examples: Yancheng Nature Reserve; Gulf of Martaban; Inner Gulf of Thailand.
    - In practice, most of the waterbird records meeting the FSN criteria were captured in the large 'regional' site as well as collectively in the component sites.
    - The approach taken here may help Partners in considering how best to nominate such sites, though a fresh work up of the original data is always advocated.
  - In some cases, notably in nature reserves (e.g. in China) where the reserve boundary may cover only part of the whole wetland, it was not possible to ascertain whether or not the waterbird record applied only to the nature reserve or to the whole wetland.
    - This may have varied according to the data source, or the focus of surveys (e.g. Anatidae vs shorebirds).
    - Generally, for this project it was assumed that the record applied to the whole wetland.
    - If a Government Partner wished to nominate only the protected area it would need to review the original count data to determine which information applied only within that reserve boundary.
  - In some cases, notably in South Korea, it was not possible to determine from the data source whether the waterbird record applied only to the intertidal part of an estuary, only to the adjacent but now non-tidal (freshwater) part upstream of a barrage or sea-wall, or to both.
    - Some sources clearly referred to both.
    - Certain waterbirds such as ducks, are known to daily or seasonally move between the two adjoining habitats.
    - Language translation for names may have been imperfect.

- Some such sites originally were entirely intertidal estuaries or bays but (as labelled in some sources) retained the original name that reflected this, even after large parts had been converted to freshwater impoundments or lakes.
- Regardless, the consultant decided to amalgamate data for several sites in this situation, including alternative or component names in the site details.
    - Examples (abbreviated): Asan bay and lakes; Cheonsu bay and lakes; Geum estuary, islands and river.

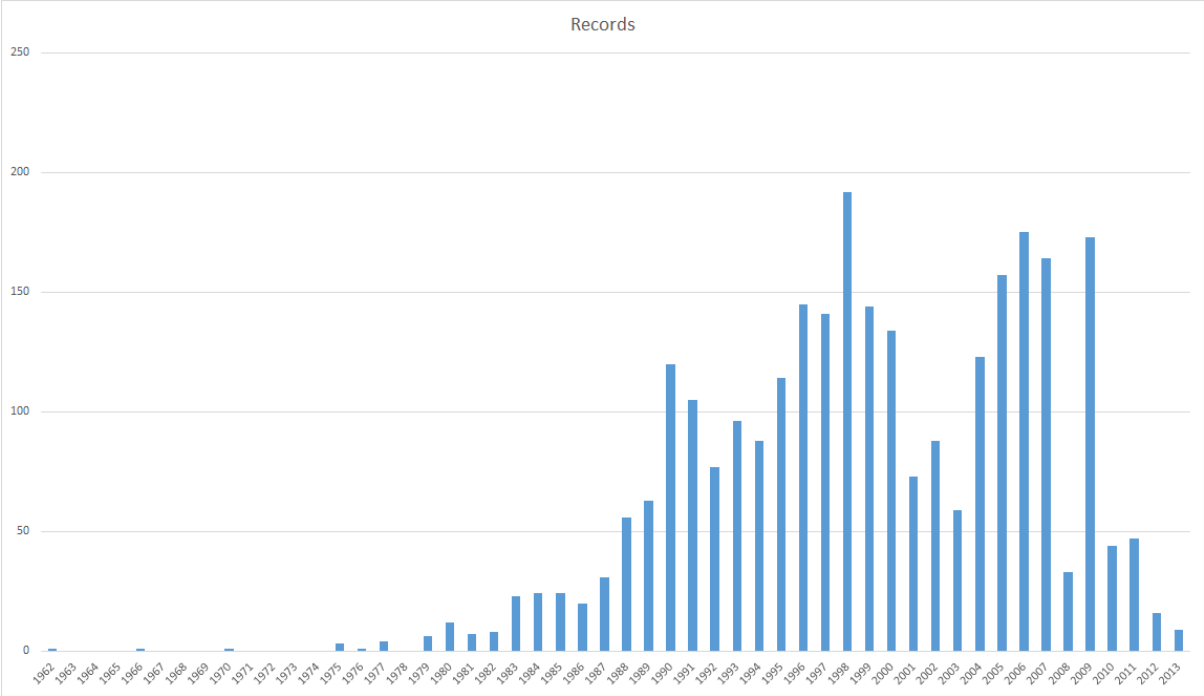
3.4 Results – data collated

The following observations in regard to results, refer to the project spreadsheet 'File 1', worksheets 11, 12 and 13.

- NUMBER AND SOURCES OF RECORDS:
    - In the time available, 3124 waterbird records were collated for the project; of these, 53 records without count data were documented. These 3124 records were reduced to 3082 after rationalisation of site names/boundaries (sheet 13).
    - Records were from all of the Flyway countries except Laos.
    - The data were drawn from over 540 sources, most of them cited in secondary sources (original records thus not viewed directly), in particular:
        - The Anatidae Atlas (Miyabayashi & Mundkur 1999)
        - The Cranes Atlas (Chan 1999)
        - The Shorebird Status Overview (as summarised in Bamford *et al*. 2008)
        - The analysis of 20 years of the Asian Waterbird Census (Li *et al*. 2009)
        - The Red List of threatened birds in Asia (BirdLife International 2001)
    - More recent records were obtained from national agency reports (e.g. the winterbird survey reports, South Korea (NIBR 2009)); survey reports of non-government organisations (e.g. China Coastal Waterbird Census Report (HKBWS 2011)); private datasets made available at no cost (e.g. Cao 2013); and recent journal articles (e.g. from *The Stilt*).

- AGE OF DATA COLLATED:
    - Figure 1 shows the age of records that could be readily analysed by date (date had been originally recorded in a number of ways).
        - 299 (9.6%) of all records were undated.
            - These records had been included in the project because, in most cases, they had been extracted from the Anatidae, crane or shorebird atlases/overviews, which considered the relevant sites to be internationally important for the applicable populations.
        - 51% of the dated records were from 1999 to 2013.
            - Thus, about half of the records were of relatively recent age (15 years or younger).
            - But about half of the records were older.
        - 17 (0.6%) of the dated records were dated before 1980.
            - Whereas the intent had been to avoid such records there were cases where, in order to be comprehensive and to recognise earlier work on identification of internationally important sites, the compiler decided to include pre-1980 records.
                - For example, the only records accessed for Lake Bolon, Russia, were from the Anatidae Atlas and the records – for 7 populations – were all dated as "1970s".

Figure 1. Age of waterbird records collated for the project, by year, to 2013.



NOTE: Vertical axis is in intervals of 50 records; horizontal axis shows years from 1962 to 2013. Analysis contributed by D. Watkins, Wetlands International.

- REPRESENTATION OF WATERBIRD POPULATIONS:
  - 179 waterbird populations are represented by at least one record [4].
  - This includes 30 populations classified by IUCN as threatened.
    - The three threatened populations that were not represented were Masked Finfoot *Heliopais personatus* and Wood Snipe *Gallinago nemoricola* (both non-congregatory) and Black-bellied Tern *Sterna acuticauda*.
  - The breakdown of the 179 populations by group is:
    - 58 shorebirds
    - 55 Anatidae
    - 24 gulls and terns
    - 20 herons, ibises, spoonbills and storks
    - 12 cranes
    - 8 grebes, cormorants and pelicans; and
    - 2 rails.
  - The documentation thus includes 66 populations not presently recognised in the FSN.
    - A significant proportion of these 66 populations may be considered as 'seabirds' according to taxonomy or principal habitat occupied.
  - Of the 77 populations not included in the project results, 51 have a population estimate and 1% threshold.
    - Many tend to be non-congregatory (e.g. Great Bittern *Botaurus stellaris*) and are unlikely to be well represented in a site network largely based on count data.

[4] One additional population, Swinhoe's Storm-Petrel *Oceanodroma monorhis*, was included because it was the basis for designation of Chilbaldo Islet, South Korea, to the FSN.

- Some others (e.g. loons, certain terns) occur in their non-breeding range in situations such as open ocean, where very few observers conduct surveys.
- Among the apparently abundant, congregatory species that occur in accessible habitats, absence of records of Horned Grebe *Podiceps auritus* is perhaps most noteworthy for future follow-up.
- Minimal effort was made to collate records of the approximately 20 populations that breed in Australasia and that are considered migratory by WPE5 due to their regular movements to one or more adjacent countries.
    - Notable exceptions were Double-banded Plover *Charadrius bicinctus* and Australian Pratincole *Stiltia isabella*, important sites for which have been well documented (Bamford *et al.* 2008).
    - Examples of not-included populations include Magpie Goose *Anseranas semipalmata*, the numbers of which exceed one million and which faces no major threat to its conservation.
    - Most of these species occur at many sites within Australia but their numbers and key sites outside of Australia, and their migration strategies are poorly known or not well documented.

- EXISTING (DESIGNATED) FSN SITES:
    - Though not the main focus of the project, the existing FSN sites were included, especially for overview of progress that has been made towards a comprehensive network (see ranking tables, below).
    - Several existing FSN sites did not appear in the project results (worksheet 13):
        Hengshui Lake National Nature Reserve, China (EAAF085)
        Nandagang Wetland Nature Reserve, China (EAAF086)
        River Shiroishi-gawa, Japan (EAAF058)
        Tokyo Port Wild Bird Park, Japan (EAAF063)
        Yashiro, Japan (EAAF033)
        Hakasskiy Zapovednik, site Ulug-kol, Russia (EAAF036)
        Taimyrski Biosphere Reserve and Zapovednik, Russia (EAAF035)
        - Some existing sites lie within larger sites as defined for the project and data for such sites therefore may have been captured, e.g. Nanjishan Wetland Nature Reserve, China (EAAF087), is within the greater Poyang Lake complex.
        - Some data arrived too late to be included in the project. (Data for the two sites in China are in Site Information Sheets but, unfortunately, were overlooked.)
        - Other explanations include inability to locate count data; and failure of the site to meet the present 1% threshold.
        - This result does not in any way affect the ongoing status of these sites as part of the FSN. Designated sites are not removed from the FSN, even after changes occur in regard to meeting the FSN criteria, unless the nominating Government Partner requests that removal.
        - It is possible that some named small sites do lie within these larger sites and yet this was not clear due to lack of mapped site boundaries or understanding of the local situation. Naming variations possibly may account for some errors.
            - For example, Yonago-Mizudori-koen, Japan (EAAF060) is within Lake Nakaumi site (noted in the project results).
            - Any future stage of the initiative could check and if necessary rectify this situation.

3.5 Results – candidate sites identified

The following observations in regard to results, refer to the project spreadsheet 'File 1', worksheet 13 (Arranged by site – 2) a sample of which is in Appendix 5.

- NUMBER OF CANDIDATE SITES:
    - The number of sites documented by the project, each with one or more waterbird record meeting a FSN criterion, was 1060. Of these, about 100 are already included in the FSN, leaving 954 candidates for potential nomination (Table 2).
        - The exact number of existing FSN requires review (see above) and a small number of candidates are 'umbrella' sites for which component sites also are included in the project results. Thus the result is probably best rounded to 950 candidate sites.
        - In recent years, the number of candidate sites in the Flyway has been unofficially stated as 'about 700' or 'at least 700'. This figure, proposed by Wetlands International, was based on just three waterbird groups for which there had been funded reviews to identify sites of international importance (Bamford *et al*. 2008, Chan 1999, Miyabayashi & Mundkur 1999). The present project has therefore confirmed and extended that number by about 250 sites.
            - Some of the 700 sites may have been excluded from the present project through application of new 1% thresholds and rationalisation of sites.
            - It should not be surprising that the project did not reveal a much larger number of candidate sites. A large proportion of the records of populations not already 'included' in the FSN were from the 700 sites, which in any case include many of the best waterbird habitats in the Flyway.
            - Similarly, it is anticipated that further perusal of existing datasets may not reveal a large increase in the number of candidate sites.
                - Apart from sites inhabited only by one or two species with very different ecological requirements to other waterbirds, the number of candidate sites can be expected to level out (i.e. reach a plateau).
                - New surveys of waterbirds in poorly-known or rarely visited regions may make a greater contribution to the list.
        - The results show that whereas the FSN could potentially include over 1000 sites, only about 10% have been designated so far.

- GEOGRAPHICAL SPREAD OF CANDIDATE SITES:
    - The number of candidate sites by country is shown in Table 2.
        - Naturally this result reflects factors such as size of country, extent and types of wetland systems, level of survey effort and number of waterbird populations occurring in the country.
        - Less obvious factors include the prevalence of congregatory populations (likely to be well represented in the results) versus non-congregatory populations (likely to be poorly represented).
        - No waterbird records were accessed for Laos.
        - These results are incomplete and may be extended by future stages of the initiative.
    - A number of simple analyses could be performed on the results but this was not a priority for the project. Additional analyses could be done at national level, or by Working Groups, or in future stages of the initiative.

Table 2. Number of candidate sites for the Flyway Site Network as determined by the project, listed by country

country	(A) number of sites meeting FSN criteria	(B) number of existing FSN sites included in the project ***	(A–B) number of remaining candidate sites
Australia	144	19	125
Bangladesh	54	5	49
Brunei	2	0	2
Cambodia	15	0	15
China *	255	24	231
Indonesia	23	2	21
Japan	181	26	156
Laos **	0	0	0
Malaysia	24	1	23
Mongolia	15	3	12
Myanmar	39	0	39
New Zealand	15	2	13
North Korea	12	2	10
Papua New Guinea	4	1	3
Philippines	25	2	23
Russia	69	6	63
Singapore	1	1	0
South Korea	121	11	110
Thailand	39	1	38
Timor Leste	1	0	1
USA (Alaska)	7	1	6
Vietnam	14	0	14
	1060	**106**	**954**

* includes Taiwan, Hong Kong, Macau.
** No records were accessed for Laos; future phases of the initiative may find criteria-meeting records for sites in Laos.
*** as reflected in the project results (of the 109 sites ever designated, one site has been designated under 2 names; 3 sites have not been transferred from former networks; in this project, 8 designated sites were not included in the records, as explained above, and one site was also listed under 8 components lakes).

The results in Table 2 are specific to the project and do not preclude additional sites being identified for any Flyway country, in the future.

- Due to the large number of sites for the flyway and the close proximity of many of them (thus indistinguishable on a small scale map), and the cartographic challenge of accurately producing a map of the entire flyway on a single page, no attempt has been made to map the 954 candidate sites.
- Similarly, given the substantial number of sites in several countries (4 countries each have over 100 candidate sites) and thus the difficulty in portraying them usefully in a single map (or even with a series of inserts), no attempt has been made to map the candidate sites country-by-country.

- OTHER COMMENTS:
    - Each of the records that refers to a non-designated site, *on its own* potentially can be used by a Government Partner to nominate a new site to the FSN.
        - Fresh review of the primary data by Partners is recommended as part of the nomination process.

4 Prioritisation of candidate sites

4.1 Data management system for prioritisation of sites

A second spreadsheet (File 2) was created to perform the prioritisation of sites, starting with a copy of Sheet 13 and including the same three reference lists. Additional worksheets were added for filtering and adjustment of the data, for applying the prioritisation criteria, for summarising the results by site, and for the rankings of sites against each criterion.

File 2: A prioritisation of candidate sites to guide future nominations to the FSN

- Sheet 20: metadata
- Sheet 21: a copy of sheet 13 (the list of candidate sites)
- Sheet 22: Adjusted and filtered data
- Sheet 23: Prioritisation criteria applied
- Sheet 24: All prioritisation results by site
- Sheet 25: Rankings by PC1 (prioritisation criterion 1)
- Sheet 26: Rankings by PC2 (prioritisation criterion 2)
- Sheet 27: Rankings by PC3 (prioritisation criterion 3)
- Sheet 28: reference list of populations and thresholds
- Sheet 29: reference list of site details (coordinates, etc.)
- Sheet 30: reference list of data sources.

It is anticipated that this file will be uploaded on the EAAFP website at conclusion of the project and a copy of the full file will be retained by the Secretariat.

4.2 Methodology and criteria

General considerations

As EAAFP had no precedent or specific guidelines for the purpose, it could be argued that the choice of criteria to apply for prioritisation purposes, to guide Partners in developing future FSN nominations, would be unconstrained. However, the Partnership Document emphasises that the FSN is for sites that are internationally important and provides criteria for their identification. Additional reasons for staying within the framework of the FSN criteria for this prioritisation include:

- the waterbird records in the new list of candidate sites were closely linked to the FSN criteria
- the principal FSN criterion (1% of population size) used in this project to identify candidate sites has practical implications for management of populations and sites; hence, this benefit would follow through to the site prioritisation.

Two key documents informed development of the project's prioritisation criteria:

- the report of a proposed system for identifying important sites under the African-Eurasian Waterbird Agreement (Nagy *et al.* 2012)

    - The foundation of the system is an index built on the contribution that the site makes to the total populations of waterbirds, across all species recorded at the site.
    - Various weightings are applied according to systems agreed in advance by the Parties; that luxury is not available for the present EAAF project.
- the system proposed for identifying important sites under the Indian Ocean – South-East Asian Marine Turtle Memorandum of Understanding (IOSEA MTMoU 2012)
    - The report presents 18 evaluation criteria to be used by signatories to the MoU as they develop a new Site Network. This comprehensive, sophisticated system uses weightings between criteria and a single overall score.
    - However, it is being applied before sites are put forward for nomination to a network and thus the proponents have opportunity to collect the required data across the 18 criteria.
    - The situation with the EAAFP FSN is different in that Partners need to consider hundreds of sites for which very few of the required data are available. Even for the 109 designated FSN sites, many lack basic information about site characteristics.
    - Furthermore, the sea turtles comprise relatively few populations whereas the FSN involves more than 250 populations, introducing greater complexity.

Drawing on these considerations and the criteria suggested in the consultancy terms of reference (Appendix 2), a set of five potential prioritisation criteria was developed and presented to the Reference Group (Discussion Paper 2):

- PC1: Proportionate contribution to the Network
- PC2: Number of populations at 1% or 0.25% level
- PC3: Number of threatened populations
- PC4: Declining populations
- PC5: Disappearing key habitats
    - Possible other criteria, to prioritise for under-represented waterbird groups, for aggregations and for governance and socio-economic factors were either captured under these five criteria or not practical to implement under the operational constraints of the project.

The majority of the Reference Group advised against using PC4 and PC5 because of limitations (e.g. incompleteness) in the data required and in the usefulness of the results.

- In regard to proposed PC4, a trend had not been systematically determined by WPE5 for all populations in the flyway.
- In regard to proposed PC5, most habitats are under threat in large parts of the Flyway so focus on one or a few habitats would be of questionable value. Furthermore, how would sites be assigned scores for habitat, which would separate them usefully into rankings?

The prioritisation criteria adopted

- **PC1: Proportionate contribution to the Network**
    - The proportion of a waterbird population at a site, and thus, ultimately, included in the FSN, is a measure of the contribution that a site, and the FSN overall, makes to conservation of the population. This concept:
        - is quantified and objective
        - is ecologically meaningful because it relates directly to the size of the population and does not just reflect presence/absence
        - will be attractive to Government Partners because for policy purposes it is highly defendable

        - will be attractive to NGO Partners because it demonstrates powerfully the value of the surveys (direct application of data collected) that their members voluntarily conduct, year after year
        - will be attractive to corporate Partners because it is potentially a tool for measuring the impact of the nomination of a site under their jurisdiction or other direct influence
        - has potential to greatly strengthen the FSN and thereby add further credibility to the activities of the Partnership.
    - The project's data management system calculates the proportion of population at a site for each waterbird record; this is the highest number counted at the site, divided by the estimate for size of population, expressed as a percentage. The proportionate contribution that a site makes, for each applicable waterbird population, is summed to generate an overall total.
        - Whereas it would be logical to use the minimum estimate of population size for this purpose, consistent with derivation of the 1% threshold for the population, trials showed that this produced many spurious results.
            - For example, if the maximum estimate was considerably higher than the minimum estimate, certain counts would produce percentages well over 100%, especially where these estimates differed by an order of magnitude.
        - Accordingly, it was necessary to use the maximum estimate of population size for applying PC1.
    - The data for this analysis are percentages, but the total serves as an index for the project's comparison and ranking purposes. The index may exceed 100 in some cases, such as where the site is internationally important for many populations.
    - This method avoids setting thresholds for scoring, such as "greater than or equal to 10%", which are subjective choices. And it cannot be successfully argued that a site supporting, for example, 12% of the population is equally importance to a site supporting 82%; the above (index) approach avoids such situations.
    - Other analyses along these lines could potentially be conducted.

- **PC2: Number of populations at 1% or 0.25% level**
    - The benefits listed above for PC1 apply to some extent also to PC2.
    - It is reasonable to consider these two thresholds (relating to FSN criteria a/6 and b/i) together because they essentially address the same issue, with 0.25% allowing for the turnover of birds at a site during their migration.
    - To apply PC2 to each site included in the data management system, the number of populations that each meet the 1% threshold (relative to estimated population size), or in the case of staging sites, the 0.25% threshold, is tallied and the result is a simple number/total.
    - PC2 addresses a criterion suggested in the Terms of Reference for the consultancy: "recognition of sites that are of outstanding importance to a wide range of migratory waterbird populations".

- **PC3: Number of threatened populations**
    - The very existence of the IUCN Red List of threatened species shows that countries, and the global community, place high significance on species that may soon face extinction. Thus, inclusion of a prioritisation criterion for this is well justified.
    - The proportionate contribution that a site makes to the conservation of a threatened population has been captured in PC1 and in PC2. But the number

of threatened species/populations recorded at a site has not yet been considered.
        - If not qualified, the number of threatened species/populations recorded at a site could be a weak criterion (due to occurrence of vagrants) but the project has limited records to those meeting the 1% threshold and additional filters are applied (see below).
    - The method for PC3 tallies the number of threatened species (CR, EN or VU) that have been recorded at each site, as shown in the list of candidate sites (File 2, sheet 21); the result is a simple number/total.
    - In this case, the range of totals will be limited and many sites will have the same result/total, rendering the results from applying PC3 less useful to form site rankings than from PC1 or PC2.
    - PC3 addresses a criterion suggested in the Terms of Reference for the consultancy: conservation of globally threatened populations.

Filtering and adjustment of the records

From trials of applying the prioritisation criteria, it became evident that certain waterbird records (e.g. very low counts, and counts well above the minimum estimate of population size) presented problems for the prioritisation process. Filtering and adjustment of such records, purely for prioritisation purposes, was conducted according to procedures/rules outlined below.

Presentation of results

Rather than generate a single score by somehow combining the results of applying several criteria, results from applying each criterion were examined independently; that is, separately, without combining 'scores'. The outcome is thus three lists/tables of rankings for the important sites (lists or tables of sites in rank order), by country.

- A Government Partner may examine these rankings of important sites in its jurisdiction and make decisions about new FSN nominations:
    - by using the criterion that it considers most relevant to its situation;
    - by selecting the top few sites, or top class of sites, from each ranking table; or
    - by taking a staged approach, working through each ranking table over several years.
- This approach would allow flexibility to suit the particular Government Partner and should minimise subjectivity.

The results are presented in detail on a country-by-country basis because nominations can only be submitted by the applicable Government Partner.

- In some of these presentations, existing FSN sites as well as un-designated candidate sites are included.

In addition, a short presentation is provided below on the most highly-ranked but still undesignated sites in the entire Flyway, so that the Partnership as a whole can identify priorities for international (flyway-scale) cooperation on conservation of migratory waterbirds.

4.3 Data management procedures and rules for prioritisation of sites

- **First stage of calculations**
    - In the process of confirming that a waterbird record met the FSN criteria, tests against the 1% threshold, 0.25% threshold and threatened species status were performed (shown in File 1: Sheets 11, 12 and 13).

- For prioritisation, an additional calculation was performed, to show the percentage of total estimated population size that the record represents (introduced in File 2, sheet 21).
    - Embedded formulae for these purposes link directly to the tables of 1% thresholds and population estimates (e.g. File 2, sheet 28 'Populations and thresholds').
    - This means that it would be possible to alter estimates or 1% thresholds in sheet 28, provided the order and identity of populations is not changed, and the changes should be automatically reflected in the results.

- **Filtering and adjustment of records to optimise meaningfulness of results**
    - Initial trials of the prioritisation criteria showed that very low counts presented a problem for the prioritisation process. Records of just a few individuals of a population that had a low estimated size could represent a site as being important, yet those birds may have been vagrants at the site and the result therefore would be misleading.
    - A decision was made to filter out (exclude) all waterbird records of less than 10 individuals (only) for the purpose of the prioritisation.
        - This filtering would not affect the list of candidate sites in File 1.
        - A record of 10 birds would have been included thus far on the basis that it met FSN criterion a/6 (1%; or possibly criterion b/i, 0.25%), indicating that the population had an estimated minimum size of at least 1000 birds.
            - Thus the filtering excluded records of populations for which the minimum size was less than 1000 birds.
            - Where records were of just one bird, the population size may have been as low as 100 birds or possibly less.
            - However, such populations were not necessarily excluded altogether: any counts of 10 or more birds were retained.
        - Table 3 shows the 129 records that were excluded by this filtering.
            - These records were from 17 waterbird populations.
            - A total of 181 records remained in the prioritisation process, collectively, for these 17 populations.
            - Only three populations dropped out of the process entirely, because of this filtering:
                - Canada Goose, *Branta canadensis leucopareia*
                - Japanese Night Heron *Gorsachius goisagi*
                - Swinhoe's Rail *Coturnicops exquisitus*
        - Table 4 shows the 35 sites that were excluded as a consequence of the filtering of records of less than 10 birds.
            - The geographical spread of these exclusions was:
                - Bangladesh: 8 sites excluded
                - Cambodia: 2
                - China: 9
                - Japan: 7
                - South Korea: 1
                - Thailand: 8.
    - Also, the 53 records without count data were excluded from the prioritisation process.
        - A consequence of this filtering was exclusion of another 16 sites (see Table 5).
    - Thus in total 51 sites were excluded, leaving about 1010 (including the existing FSN sites) for prioritisation.

Table 3. Records excluded from the prioritisation because of count data less than 10.

waterbird population	records omitted	number of countries with records omitted	records remaining for analysis	number of countries with records remaining for analysis
Baer's Pochard, C, E, SE & S Asia	20	5	59	5
Black Stork, E Asia (non-bre)	8	2	11	3
Black-headed Ibis, SE Asia	2	1	13	4
Canada Goose, leucopareia, Kuril	1	1	0	0
Chinese Crested Tern, E China (bre)	3	1	2	1
Dalmatian Pelican, E Asia	11	1	5	1
Greater Adjutant, Cambodia (bre)	6	3	8	1
Japanese Night-Heron , E & SE Asia	2	2	0	0
Long-billed Plover, E, SE & S Asia	1	1	1	1
Red-crowned Crane, E China (non-bre)	3	1	12	1
Sarus Crane, sharpii, Indochina	1	1	3	2
Sarus Crane, sharpii, Myanmar	2	1	1	1
Snow Goose, caerulescens, E Asia	13	3	2	2
Spoon-billed Sandpiper, E Siberia (bre)	24	9	22	8
Spotted Greenshank, NE Asia (bre)	18	9	41	9
Swinhoe's Rail, C & E Asia	13	3	0	0
White-eared Night-heron, SE Asia	1	1	1	1
totals	129		181	

Table 4. Sites excluded from the prioritisation because of count data less than 10.

country or territory	site name
Bangladesh	Bodur Makam
Bangladesh	Char Kukri Mukri
Bangladesh	Halodia
Bangladesh	Khana Muia Beel
Bangladesh	Nurul Islam Char
Bangladesh	Peelkhana (Bangladesh Rifle Bird Park)
Bangladesh	Shibaloy, Kamalapur, Bhumiheen Chars
Bangladesh	Teknaf Coast Cmbined
Cambodia	Prek Spot
Cambodia	Stoeng Sangke
China	Arketao
China	Changhaizi
China	Changjiangudao Baijitun NR

country or territory	site name Table 4 cont.
China	Daming Shan Nature Reserve (Wuming county)
China	Futou Wan
China	Korla
China	Tian Er Zhou Milu Nature Reserve
China	Wuzhishan Islands
China	Xisha Islands (South China Sea)
Japan	Ariake reclamation
Japan	Gobo-shi
Japan	Kamisu-machi
Japan	Kiso River Mouth
Japan	Kitakami River mouth
Japan	Shirahama-cho
Japan	Tomisato
South Korea	Haenam Lake
Thailand	Bo Muang/Tha Maprao
Thailand	Bung Kung Hong
Thailand	Goot Ting Reservoir
Thailand	Inner Gulf: Samut Sakhon
Thailand	Khon San
Thailand	Nong Dim Dam
Thailand	Nong Sanoh
Thailand	Pak Chong-Lamtakong

Table 5. Sites excluded from the prioritisation due to lack of count data.

country	Site name
China	Bachang River Estuary
China	Dali Nor Nature Reserve
China	Dazong Lake
China	Huret
China	Majia Marshes
China	Sanhe Wetland
China	Wafangdian City (Coast)
China	Xin Bulag Dong Sum
China	Xinglong Dongsha Dao Nature Reserve
Russia	Chaunskaya Tundra
Russia	Khasan Plain
Russia	Khasan Plain
Russia	Kytalyk Resource Reserve
Russia	Middle Omolon valley
Russia	Muraviovka Nature Park
Russia	Ulbansky Lowland

- No filtering was done to exclude particular populations for which some count data were likely to be erroneous due to misidentification (e.g. snipe *Gallinago* spp.; Spotted Greenshank *Tringa guttifer*) or where rapid recent declines in population size, not yet reflected in WPE5, may lead to the importance of sites being overstated in the present project (e.g. Baer's Pochard).
    - The best way to address the issue in the short term would be for Partners to closely examine original records of these populations (indeed, of all populations) while preparing new site nominations and exclude suspect data where they consider appropriate.
    - Future stages of the initiative, with considerable time allocated, could include work to address this issue.
- No filtering was done at this stage to exclude sites that were known to have deteriorated in condition and thus probably no longer support the high numbers recorded for certain populations at the site.
    - Quantitative information on the condition of sites is not available in a consolidated form to provide a basis for the necessary comprehensive assessment.
    - In excluding a changed site, 'positive' outcomes of habitat change may be overlooked.
        - Some sites are known to have deteriorated as habitat for some populations (e.g. shorebirds requiring intertidal mudflats) but increased in value as habitat for others (e.g. Anatidae preferring the freshwater storages created by exclusion of saline water).
    - However, discretionary exclusion of such sites, where deterioration of key habitats is well known and substantial was exercised at the last stage of the prioritisation process (see below).
    - Regardless, Government Partners should consider the present condition of a site, as well as potential for restoration, while preparing any new site nomination.
    - Future stages of the initiative, with considerable time allocated, could include work to address this issue.
- Calculation of the percentage of population size that occurred at a site returned values above 100% in 24 instances. These are evident in File 2, sheet 21.
    - Such cases arose where the highest count at a site was greater than the maximum estimate of population size in WPE5. This situation mainly refers to two scenarios:
        - Relatively small populations that are recovering or otherwise increasing at a rapid rate; hence the present highest counts are in some cases above the published maximum estimate of population size, e.g. some populations of Greater White-fronted Goose.
        - Relatively small populations that are declining at a rapid rate; hence the past highest counts (used in the project) are in some cases above the published maximum estimate of population size, e.g. some populations of Red-crowned Crane *Grus japonensis*.
        - These problems should influence future updates of WPE.
        - Some of the applicable records were not out-dated but were very recent, e.g. less than two years old.
    - For present purposes, any result over 100% was therefore adjusted to show exactly 100%, i.e. a ceiling of 100% was set.
    - As shown by trials, failure to do this may have resulted in spurious results where one problematic waterbird record unduly influenced the outcome.
        - Trials revealed that this scenario would be far worse if the minimum estimate of population size was used for this calculation.

        - This was especially significant where the difference between minimum and maximum population estimates was an order of magnitude or more:
            - e.g. Black Stork *Ciconia nigra* (shown in WPE4 as "less than 500" but transformed to the range "1 to 500" in WPE5).
            - In future editions of WPE, the compilers should avoid order-of-magnitude ranges for population estimates, wherever possible.
    - The results of the filtering and adjustments are reflected in File 2, sheet 22 ('Adjusted & filtered data').

- **Applying the three criteria for prioritisation**
    - The next step was to generate the results for PC1, PC2 and PC3.
    - This involved summing the information generated at the first stage and after filtering (see above), across all waterbird records displayed for a particular site, site-by-site and country-by-country.
        - Results are displayed in File 2, sheet 23 and summarised in sheet 24 ('All results by site')
            - Sheet 24 is values only; it is not linked to sheet 23.
            - Time did not permit embedding of formulae to calculate the results for PC1, PC2 and PC3; the results were computed manually.

- **Producing tables of rankings from the prioritisation**
    - Ranking of sites was done country by country; as site nomination is a national responsibility this approach provides information in the most useful form.
    - Sites were ranked by country for each of the three prioritisation criteria.
        - Results (scores) in File 2, sheet 24 were sorted into descending order and presented in tables in separate sheets (25, 26 and 27) for each prioritisation criterion.
    - Classes were assigned, according to the circumstances of each country and the nature of the results/numbers generated.
        - This was to give a quick visual overview of where a country might focus its nomination efforts in the next few years and over a longer period (10 years or more).
        - It was not possible to apply a consistent system of classes across all countries because of the big range in number of sites (some countries with less than 10); also, sites with low scores tend to create many equal scores and thus some difficulties for ranking.
        - Hence, classes were assigned on a case-by-case basis in a way that was considered likely to be most helpful to the applicable Government Partner in its particular circumstances.
            - Essentially, the aim was to apply 'natural groupings' that would give useful practical guidance to the Partner.
            - For larger countries with many sites and a wide range of scores at the 'top end' of the results, usually the top classes(Class 1 and Class 2) were applied to the 'top 10' and 'next 10' sites, in some cases to a third level (Class 3).
            - Where there was no clear division between top ten and next ten or the rest, 'Class 1' and 'Class 2' were allocated as wider or narrower groups as appropriate to the values and spread of data and number of sites (wider for larger countries with more sites; and conversely).

                - In some cases it was not reasonable to assign both classes, or any class at all.
                - For PC2 or PC3, if a score was 2 or less, no class was assigned; this avoided large classes with equal scores.
    - At this stage, sites that had already been designated in the FSN were identified by using red font for the site name.
        - In some cases a direct match between a site name (and/or its implied boundary) and the name of the designated FSN site was not possible.
            - Regardless, if a site listed in the project results clearly or apparently included all or a substantial part of a designated FSN site, then it was marked in red.
        - Several designated FSN sites did not appear in the ranking tables for this project, for reasons stated above (e.g. lack of count data).
            - The project results do not imply any change to existing FSN designations.

- **Incorporating knowledge of sites that have deteriorated**
    - For the top classes for each prioritisation criterion, knowledge of sites that had deteriorated or to which other special circumstances applied, was written in a comments field (File 2, sheets 25, 26 & 27).
        - This annotation was performed especially for sites that are well known to have declined or be seriously compromised such that they probably or certainly no longer meet 1% or 0.25% for certain populations, or support far lower numbers (and thus generate much lower indexes for PC1).

4.4 Results of the prioritisation

A sample of the results of applying the three prioritisation criteria is in Appendix 6. This was extracted from File 2, sheet 24 ('All results by site').

Complete tables of rankings

Lists of results from the ranking of sites, for the top classes, are in Appendixes 7A, 7B and 7C; these were extracted from File 2, sheets 25, 26 and 27 respectively. The appendixes show sites in descending order of rank, arranged in classes as described above; actual scores may be read from File 2. Some observations follow:

- Existing FSN sites are prominent in the top class or classes, forming more than half of Class 1 for several countries, in regard to PC1 and to a lesser extent for PC2.
- Candidate (undesignated) sites also feature prominently in the top class or classes, so there is plenty of scope for new nominations of highly ranked sites.
- PC1, with its very wide range of scores, provides the most useful separation of sites into rankings and classes; PC2 is less useful and PC3 is least useful because of its low range of possible scores.

The top-ranked candidate sites by country

The top-ranked candidate site for each country as determined by applying each of the three prioritisation criteria is shown in Table 6. Site coordinates are given in Appendix 8.

Certain sites have been filtered from the Table by the author after consideration of site condition (as per annotations in Appendixes 7A, 7B, 7C) and/or data quality, as outlined in notes to the table and in text above.

Table 6. Top-ranked candidate sites for nomination to the Flyway Site Network, by country, derived from the project's three criteria for prioritisation (Appendixes 7A, 7B and 7C) and consideration of site condition and data quality.

	top-ranked candidate sites (after filters applied: see notes below table)		
country	**as determined by Prioritisation Criterion 1**	**as determined by Prioritisation Criterion 2 (result >2 pops.)**	**as determined by Prioritisation Criterion 3 (result >2 pops.)**
Australia	SE Gulf of Carpentaria	SE Gulf of Carpentaria	no result
Bangladesh	Pashua Haor	Pashua Haor; Maulavir Char	no result
Brunei	Wasan Rice Scheme	no result	no result
Cambodia	Prek Toal	Prek Toal; Ang Trapeang Thmor Rsvr.	no result
China	East Dongting Lake NR	East Dongting Lake NR	East Dongting Lake NR
Indonesia	Pantai Sejara (Asahan regency)	Bagan Percut	no result
Japan	Lakes Izunuma & Uchinuma	Notsuke Bay	Isahaya Higata (Isahaya Bay)
Laos	no data	no data	no data
Malaysia	Pulau Tengah (Klang Islands)	Pulau Tengah (Klang Islands)	no result
Mongolia	Buir Nuur complex	Buir Nuur complex	Uldze (Ulz) River Basin
Myanmar	Gulf of Martaban	Gulf of Martaban	no result
New Zealand	Manukau Harbour	Manukau Harbour + 2 other sites	no result
North Korea	Anpyong Plain	no result	no result
Papua New Guinea	Kikori Delta	Kikori Delta	no result
Philippines	Manila Bay	Manila Bay	no result
Russia	Kolyma Lowlands	Kharchinskoe Lake	Zeya - Bureya Lowland
Singapore	no result	no result	no result

Table 6 cont.	top-ranked candidate sites (after filters applied: see notes below table)		
country	**as determined by Prioritisation Criterion 1**	**as determined by Prioritisation Criterion 2 (result >2 pops.)**	**as determined by Prioritisation Criterion 3 (result >2 pops.)**
South Korea	Ganghwa Island (tidal flats)	Yeongjong (Yong Jong) Island	Ganghwa Island (tidal flats)
Thailand	Inner Gulf of Thailand	Inner Gulf of Thailand	no result
Timor Leste	1 site for this country, named "Timor"	no result	no result
USA	Alaska Peninsula	no result	no result
Vietnam	Tram Chim National Park	Xuan Thuy Ramsar Site	Xuan Thuy Ramsar Site

NOTES:

1. The table does not include existing FSN sites.
2. The table does not include sites that are considered to certainly, or very likely, no longer support key populations or high numbers for which the site met FSN criteria (see comments column, Appendix 7A).
3. New Zealand, PC2: the two other sites are: Kaipara Harbour; and Parengarenga Harbour.
4. No data were accessed for Laos. Future phases of the initiative may find criteria-meeting records for sites in Laos.
5. Only sites with scores of more than 2 were included under PC2 and PC3.
6. The results in Table 6 are specific to the project and do not preclude additional sites being identified for any Flyway country, in the future.

7. **CHINA**. In regard to PC1, the top undesignated site (East Dongting Lake) is supported by 24 populations and many of the key records for PC1 are from surveys as recent as 2011. The record (and WPE5 estimate for China) of Greater White-fronted Goose may be problematic but even if the species no longer occurred there, the site would still equal-rank the next contender (North Bo Hai Wan).
8. **JAPAN**. The top-ranked undesignated site for PC1 (Notsuke Bay: Appendix 7A) scored mainly on the basis of a count of 3500 Brent Goose, undated but pre-1995; therefore, a reassessment of the status of this species at Notsuke Bay is recommended. For now, the next-ranked undesignated site, Lake Izunuma-Uchinuma, is shown in Table 6.
9. **MYANMAR**. Scores for PC1 for the top two sites (Irrawaddy R., Indawgyi L: Appendix 7A) are heavily influenced by records that could be problematic. The next highest site is Gulf of Martaban.
10. **PHILIPPINES**. The top-ranked site for PC1 (Leyte: Appendix 7A) scored solely on the basis of a count of 1600 Chinese Egrets in 1991 whereas the population size has declined; probably, lesser numbers occur there now. The next-ranked site is Manila Bay.
11. **NORTH KOREA & RUSSIA**. The data for un-designated sites in Class 1 for PC1 in both of these countries are almost exclusively pre-2000; thus, a review of more recent data and/or conduct of fresh surveys is recommended.
12. **SOUTH KOREA**. For PC1, Class 1, four undesignated sites that combine intertidal and reservoir habitats were excluded from Table 6 on the basis that the condition of their intertidal components has radically changed, or requires re-assessment (see comments column, Appendix 7A).
13. **THAILAND**. The score for PC1 for the top-ranked site (Beung Boraphet: Appendix 7A) is heavily influenced by a count of 400+ Baer's Pochard in the 1980s. As numbers of this species have declined markedly and a recent count of 200+ of this species (unlikely) would be needed to maintain its rank, it has been excluded from Table 6. The next-ranked site is Inner Gulf of Thailand.

Some observations and implications for conservation of sites and habitats follow:

- For each of 12 countries, the same site is listed in regard to two or more of the three prioritisation criteria. This provides a clear focus for Partners.
- For each of 9 countries, two or more sites are included in the table and 32 sites (rather than just one per country) are included in the whole table. This illustrates a benefit of applying more than one prioritisation criterion.
- The author is aware of present efforts or recent serious discussions in regard to Government Partners nominating several of the sites (or parts thereof) in Table 6. Inclusion of these sites in Table 6 should give additional justification for progressing those nominations.
- The 32 sites include some that are very large (more than 100 km in width) and some that are relatively small (a few km wide, or less). It is not just the largest sites that are the most important.
- Classification of a few sites is problematic but roughly half of the 32 sites are principally coastal/intertidal (17 sites) and half are inland/non-tidal (15). This illustrates the importance of focussing FSN nominations and other conservation efforts on inland as well as coastal landscapes.
- Among the 32 sites there are some protected areas and some Ramsar Sites, which may be easier for Government Partners to nominate than sites without such status. The results also confirm that many highly important sites are not protected or Ramsar-listed at this time.
- Some of the sites are highly modified in terms of hydrology, surrounds and/or other features and one is artificial, yet they retain substantial conservation value.

Priority sites for international (flyway-scale) cooperation

The five, highest-ranked candidate sites in the EAA Flyway as determined by applying each of the three prioritisation criteria are shown in Table 7. Site coordinates are in Appendix 8.

Some observations on the results are as follows (to be read in conjunction with notes below Tables 6 and 7, e.g. regarding filters applied):

- Use of different criteria introduces additional sites.
- PC3 is the least useful because the low numbers result in many sites with equal rank.
- The top site against all three criteria is East Dongting Lake Nature Reserve, China; one other site is in two or more of the lists: Yeongjong Island, South Korea.
- In terms of geographical focus for international cooperation, 7 countries are included in Table 7 and these are spread throughout the flyway (2 in North-East Asia; 4 in South-East Asia and adjacent; 1 in Australasia).

In the context of undesignated candidate sites for the FSN, the sites in Table 7 may be considered as high priority for international cooperation for conservation of migratory waterbirds.

Further examination of project File 2 sheet 25 reveals that the top five sites against PC1 in the Flyway were:

- Poyang Lake, China (score 1056)
- Eighty Mile Beach, Australia (677)
- Yancheng Nature Reserve, China (417)
- Moroshechnaya River Estuary, Russia (392)
- Daursky Nature Reserve (Torey Lakes), Russia (372)
    - All of these sites are already designated in the FSN.

Table 7. Highest-ranked candidate sites in the EAA Flyway as derived from the project's three criteria for prioritisation (Appendixes 7A, 7B and 7C) and consideration of site condition and data quality.

top-ranked candidate sites (after filters applied: see notes below table) (country and score are given)		
as determined by Prioritisation Criterion 1	**as determined by Prioritisation Criterion 2**	**as determined by Prioritisation Criterion 3 ****
East Dongting Lake China 386	East Dongting Lake China 24	East Dongting Lake China 7
Prek Toal Cambodia 294	Gulf of Martaban Myanmar 23	Ganghwa Island South Korea 6
North Bo Hai Wan China 285	Dongsha Islands China 20	Yeongjong Island South Korea 5
Pashua Haor Bangladesh 169	Shi Jiu Tuo/Daqing He China 20	**
SE Gulf of Carpentaria Australia 150	Yeongjong Island South Korea 18	
	Inner Gulf of Thailand Thailand 18	

NOTES:

1. The table shows sites that are not yet included in the FSN; it does not include existing FSN sites.
2. Sites excluded from Table 6 were also excluded from Table 7.
3. ** Seven sites each scored 4 for PC3.
4. Also see notes to Table 6.

Examination of project File 2 sheet 26 reveals that the top five sites against PC2 were:

- Yancheng Nature Reserve, China (60 species)
- Poyang Lake, China (39)
- Daursky Nature Reserve (Torey Lakes), Russia (33)
- Huang He (Yellow River Delta) Nature Reserve, China (30)
- Deep Bay (including Mai Po & Futien NR), China (28)
- Nakdong Estuary, South Korea (28)
    - All of these sites are already designated in the FSN.
    - 50 sites in sheet 26 were each identified as internationally important for 10 or more populations.

Even after making allowance for some problematic waterbird records at some of the sites in these two short lists, clearly each one is exceptionally important for migratory waterbirds and deserving of high priority in ongoing international cooperation to optimise conservation outcomes.

- These two lists include sites in far northern, staging and non-breeding regions of the EAA Flyway, further illustrating the need for conservation in all regions of the Flyway.

The impact of data for rapidly declining populations

It is useful to consider the impact of one population, Baer's Pochard, which is probably the most extreme example of a handful of populations that have declined rapidly in very recent times to the extent that numbers previously recorded at some sites now well exceed the published (WPE5; Appendix 4) and presumed (much lower) population size. The following observations arose from a brief investigation on this population:

BAER'S POCHARD:

- Of the 55 records of the population, which were included in the prioritisation process, 5 represented 100% or more (but were limited to 100%: see above) of the maximum population estimate (1000 birds: Appendix 4), thereby substantially impacting the score for prioritisation criterion 1 at the applicable sites.
    - In order to more accurately reflect the present situation, the maximum estimate could be lowered arbitrarily, for example to 250 birds (thus matching the minimum estimate).
        - But this would cause an additional 11 sites to contribute a score of 100 against PC1 – clearly a far more problematic outcome due to the impact on so many site scores, and being unlike the situation for any other population in the project.
- Baer's Pochard met the 1% threshold for two of the 32 top sites in Table 6, so the impact on their inclusion if numbers had fallen at these sites by half, or to zero, was considered (assuming no such changes to data for other sites):
    - Pashua Haor, Bangladesh: contribution of Baer's Pochard to PC1 was a score of 60; rank did not change if numbers still occurring at the site 'fell' by half, but rank dropped two places if numbers fell to zero.
    - East Dongting Lake, China: contribution of Baer's Pochard to PC1 was a score of 43; rank did not change if numbers still occurring at the site 'fell' by half, or to zero.
- Records older than 15 years (but not older than about 30 years) were included in the project (see above), but if records of Baer's Pochard older than 15 years were excluded in order to remove high counts that apparently no longer occur:
    - 44 records would be lost leaving only 11.
        - The 11 records still span the four countries with the most records/sites of this species: China (5), Bangladesh (4), Myanmar and Thailand (1 each); records from one country (Russia, 1 site) would be lost.
    - The highest remaining count would be 760 birds at Wuchang Hu, China, in winter 2010-11.
        - This very recent and reliable record suggests that a maximum estimate of around 750 birds – or, to be conservative, 1000 as used in the project – remains appropriate for Baer's Pochard.
    - However, in this project a major obstacle to eliminating records based on date was that – due to operating constraints – the project did not have scope to replace those records with more recent, but nevertheless acceptable records (i.e. still meeting the 1% threshold) that may have existed for the same sites.
        - In other words, whereas it may be reasonable to exclude some sites from the results due to known catastrophic loss of habitat (as was done in compiling Table 6), it would not be reasonable to exclude sites that may still be supporting numbers at 1% levels – yet there was no means to address that question.
- Overall, the situation with Baer's Pochard and perhaps one or two other rapidly declining species perhaps has caused a slight overstatement of the importance of

a few of the top-ranked sites but – given the wide range of populations typically supported by top sites – limited overall impact on the project results.

Users are reminded that nomination of sites is at the discretion of the relevant Government Partner and that even if a site does not appear in the rankings, if it is included in the list of candidate sites (File 1, sheet 13; Appendix 5) – perhaps with just one waterbird population meeting a FSN criterion – a Government Partner may nevertheless choose to nominate that site to the FSN.

Furthermore, the present project is just one of many possible ways to guide future FSN nominations and it is possible that its results may be updated in a future stage of the initiative.

5 Providing access to project products and future updates

5.1 Access to present project products

The main products of the project are:

- The integrated and updated list of candidate FSN sites (as developed in the project's spreadsheet File 1 and with a sample shown in Appendix 5).
- The guidance for future FSN nominations arising from the project's prioritisation of those sites (as developed in the project's spreadsheet File 2 and summarised in Appendixes 7A, &b and 7C).
- This project completion report.

Item 5 in the project terms of reference (Appendix 2) requests that data and information (products) from the project be uploaded to the EAAFP website and that this should be done in a way that furthers the possibilities to periodically update the data and information.

As nearly all of the waterbird records were obtained from sources in the public domain, it would be appropriate to make these three products available on the EAAFP website, in their entirety, once approved by the EAAFP Secretariat.

- Government Partners will be preparing future site nominations to the FSN.
    - For this purpose they will require a full list of candidate sites in their territory.
    - And rankings of sites in their territory, to guide selection of sites.
    - For reviewing the candidacy and preparing a Site Information Sheet, they will also require full details of each candidate site, including:
        - coordinates (for less well known sites)
        - names of populations that meet the FSN criteria at the site
        - the relevant count data
        - information on sources of the data, to facilitate review of original data.
    - Therefore, for this purpose Government Partners may be best served by having access directly and online to full copies of the project's two files and report.
    - Government Partners will hopefully make site nominations well into the future, so access to updates of the project products would be desirable: this is discussed separately below.
    - Other Partners and experts may support the Government Partners in preparing site nominations and community organisations may have a role in advocating for nomination of sites.

- Partners may also use the data and information when preparing their regular reports to EAAFP on national progress against the EAAFP Implementation Strategy 2012-16.

    - For this purpose, since about 2008 the Partners have used a reporting template that EAAFP had custom-made. This needs to be updated to reflect changes in the Implementation Strategy 2012-16, but present questions directly relevant to a country's FSN sites include:
        - Number of designated sites and number recently nominated (Qs 2, 3)
        - Changes in biodiversity at sites (Q 7)
        - Management planning and guidelines for sites (Qs 9-12, 17)
        - Impact of development proposals (Qs 13, 20-23)
        - Integration of conservation and sustainable development (Q 16).
    - Most of this information would be provided by the ongoing EAAFP project to document the existing 109 FSN sites.
    - The role of products from the present product for this purpose thus seems quite limited, until/unless major changes are made to the reporting template.

- EAAFP Working Groups and waterbird experts may use the project products to help them identify gaps in knowledge, to guide future survey efforts.
    - For this purpose, these users would probably be best served by having copies of all of the present project products.

- International organisations such as Wetlands International and BirdLife International may use the products in developing global or regional initiatives such as planning for updates of the Waterbird population Estimates database.
    - For this purpose, these users would probably be best served by having copies of all of the project products.

- The EAAFP Secretariat may use the products in writing proposals for future stages of the initiative and pursuing other project recommendations.
    - It will have copies of the project products in its filing system.

In summary, the three project products should be uploaded by the EAAFP Secretariat to its website as soon as it deems appropriate.

5.2 Conducting future updates

As new data come to hand, Partners may wish to access updated versions of the project products. Relevant considerations are listed below:

- Any update of the list of candidate sites and prioritisation would require a substantial financial commitment by EAAFP, at least as much as for the present project.
    - As the Secretariat normally has a small budget for such work, this would require a major contribution by a Partner or other benefactor.
    - Given the constraints on the present project, including inability to fund fresh queries of original datasets, as well as the various recommendations arising from the project (see below), it is likely that a much larger financial investment would be needed for a substantial update.
    - The benefits of a high investment would be influenced by the experience of Partners in using products from the present project, which may take a year or two to be fully evident.
- As the time and financial constraints on the present project dictated a simple method of data collation and analysis, future updates using the present data management system – though feasible – may be relatively time consuming and labour intensive.
    - Future updates may benefit from design of a new data management system into which the present records can be incorporated.

        - This may be influenced by the scope and scale of fresh querying to be done on original datasets.
- Suitable personnel to conduct updates need to be identified and provided with sufficient time and/or funds.
    - If such work is to be done by a consultant, the cost will be high.
    - If to be done by the Secretariat (e.g. Science Officer), due to competing demands a sufficient quarantine of time in the officer's workplan will be essential to ensure timely progress.
- Whereas an online system for updating the project products may be feasible, several key issues must first be addressed:
    - Either a written or built-in system of quality assurance would be vital to ensure that procedures are consistently followed and standards met, otherwise the products will lose much of their value.
        - Site access may need to be password-protected with only one (or rather) few users per country having access.
        - A single person, such as the Secretariat's Science Officer, would need to be authorised to vet incoming data and make various editing decisions.
    - Consultation among Partners would be needed, to determine levels of data disclosure and resolve custodianship issues.
    - The system would need to be capable to incorporate future changes to population estimates and 1% thresholds.
    - Such a system would necessarily be sophisticated and thus require development under a separate study.
        - Adequate testing and approval by Partners would be essential before the online system could be made operative.
- Finally, wise use of resources demands that use or adaptation of existing mechanisms, which would meet the objectives of updating (and long-term management of waterbird and site data), should first be fully investigated.
    - To this end, as advocated by the EAAFP Task Force on Monitoring and as has been raised at previous EAAFP Meetings of Partners, full consideration should be given to adapting the Critical Site Network Tool (Wings Over Wetlands 2013) approach for use in the EAAF.
        - This would require a large investment of time and money, therefore global and/or corporate funding sources should be approached.
        - Nevertheless, this tool would likely address more than one need within EAAFP and would probably serve regional and global needs well into the future.

Drawing these issues together, it seems clear that it is neither timely nor practical to make online updating of the project products possible in the immediate future. However, several recommendations of the project if acted upon may pave the way for that facility.

6 Conclusions and recommendations

6.1 Assessment of achievement against project objectives

The two primary, unstated but inferred objectives of the project were met:

- Sites that qualify as being internationally important for migratory waterbirds in the EAAF have been documented, using the FSN criteria.
    - An integrated and updated list of candidate sites for nomination to the FSN has been prepared for use by the Partnership.

- The listed sites, subject to some filtering, have been prioritised for nomination to the FSN using purpose-made criteria that also relate to the FSN criteria.
    - Ranking tables by three prioritisation criteria have been prepared for use as guidance to the Government Partners (assisted by other Partners and experts) in selecting sites for nomination.

The third objective, making these tools widely available, will be addressed by the EAAFP Secretariat and consultant once the project report has been finalised.

6.2 Lessons learnt and caveats

Many lessons were learnt in implementing the project, notably:

- Considerable investment of time and effort in the design stages is well worthwhile for novel projects of this type.
    - Engagement of a technical Reference Group was highly beneficial for the project in this regard, though it required a significant investment of time, coordination and writing by the consultant.
- The accessing and collation of waterbird count data from dispersed unrelated sources is highly time consuming, especially if records have to be gleaned manually.
    - This task occupied more than half of the present project effort.
    - The voluntary contribution of about 50% of the project's accessed records, in digital format, by Wetlands International greatly reduced the time that otherwise would have been required.
- Pursuit of additional data is a somewhat open-ended task but the number of new candidate sites tends to soon reach a low slope if not a plateau, if major overview (secondary) sources are accessed first-up.
- It is not feasible to access or query large original datasets on waterbird count data unless adequate funding and time is available to enable custodians – government or otherwise – to respond to query requests.
- Having a number of fundamentals in place before such a project starts would enable better use of time and resources on the principal project activities.
    - Integration and standard formatting of waterbird records across all waterbird groups, and development of an updated list of populations and 1% thresholds, needed to be conducted in early stages of the present project.
    - That work should greatly facilitate further stages of the initiative if undertaken in the near future.
- Waterbird count data, especially from unrelated sources, tend to contain many anomalies that require special consideration such as filtering of records that will otherwise produce spurious results after analysis.
    - Despite their imperfections, waterbird count data as presently available in the EAAF can be used effectively to identify candidate FSN sites and provide guidance to Partners on prioritisation.
- This type of project is only as good as the quality and scope of the foundational information over which the project implementer has little control:
    - the waterbird count data (identifications; accuracy; completeness)
    - official waterbird population estimates
    - readily available information about the sites.

Significant caveats or limitations on the project results/products are summarised as follows:

- This is not the only way in which guidance can be provided on new site nominations.
    - Complementary methods may be entertained to better address particular aspects of the flyway's waterbirds and sites, e.g. non-congregatory species (if indeed it is possible or effective to address such species in a site network).

- Government Partners are encouraged to review all waterbird data, as appearing in the project products as well as new information, in considering new site nominations.
- Site boundaries and names have been partly but not adequately defined and integrated across all waterbird survey efforts in the EAAF:
    - Some of the sites recognised in the project lack location coordinates.
    - A few of the included sites are large-scale 'umbrella' sites for which component sites have also been included.
    - Close scrutiny by Partners and experts may lead to amalgamation of some sites and splitting of others, depending on purpose.
    - Improvement of site-related limitations is a major priority for future work.
- Some gaps in the results reflect gaps, or weaknesses in data, in the list of estimates of population sizes of waterbirds in the EAAF.
    - Coverage of members of the rail family is especially poor.
    - A few of the estimates are already out of date, mainly due to rapid declines in numbers of several species.
- About half of the waterbird records accessed for the project and with a date assigned, and most of the records for some countries (e.g. Russia), were more than 15 years old.
    - This must be kept in mind while interpreting the project results because many sites have deteriorated in condition and many populations have declined, over the last one to two decades.
- Assignment of classes to the prioritisation rankings is somewhat arbitrary and the classes could be composed in a number of other ways to suit purpose.

6.3 Recommendations for next steps

1. PROMOTION AND USE OF PRODUCTS As a result of EAAFP's investment in the project, the Partnership has two new tools to support strategic development of the Flyway Site Network: an integrated and updated list of candidate sites; and guidance on prioritisation of nominations, country- by-country.
    - It is recommended that Partners take up and promote use of these products, as and where appropriate, in Partnership activities and at national level.
    - Most importantly, Government Partners should each aim to complete the nomination of 1 to 3 new sites within their territory to the FSN before the 8th Meeting of Partners.
        - Partners are encouraged to focus on nominating the highest-ranked candidate sites wherever possible.
    - In order to broaden the scope of the FSN and make it truly holistic, Partners could include consideration of the listed candidate sites that support examples of the 66 populations not included in the FSN thus far.
        - Essentially, these are the populations other than Anatidae, cranes and shorebirds.
        - Partners could also update their existing nominations by adding populations that qualify the site for the FSN but that were not included in the original nominations.
    - As only a portion of the ca. 1000 candidate sites are likely to be added to the FSN in the next several years, all Partners are encouraged to use the list of candidates to generally promote greater awareness of internationally important wetlands, and their wise management, at national and flyway levels.

2. DECISION ON DIRECTION With the products of this project to hand, the Partners should decide if these products meet their immediate needs for development of the FSN or whether subsequent steps should be made in the initiative.

- Full assessment of the products by Partners may take some time, perhaps the period until the 8th Meeting of Partners, to enable trial through extended use of the products.
- Next steps could include:
    - Development and implementation of complementary approaches to prioritisation of candidate sites.
    - Taking the present products to a higher level of refinement through a comprehensive update and revision.
    - Alternatively, directing investments to waterbird monitoring and the synthesis of the count data (such as adaptation of the Critical Site Network Tool for the EAAF).
- Preliminary discussion on next steps could occur at MoP7 and should include cost implications and organisations/ personnel to conduct work.
- Priority should be given to actually nominating new sites to the FSN.

3. COMPLEMENTARY APPROACHES Some complementary approaches to prioritisation were mentioned in Reference Group consultations, such as focussing on particular families or groups of waterbirds as the starting framework, and taking a unique approach for oceanic seabirds. If EAAFP wishes, the proponents could be invited to develop proposals for such work and present to the Partners for consideration. Key issues will include:
    - benefits to EAAFP including an indication of how much the new work would add value to the present products by filling identified gaps; also to include costings, personnel and timeframes for implementation.
    - however, given that only about 10% of the candidate sites are designated in the FSN, follow-up action on new site nominations using the present project products may be higher priority than developing new approaches to prioritisation.

4. MAJOR UPDATE AND REVISION As with any assessment of important sites, the results of the present project can be updated and revised as new information comes to hand. In addition, a number of improvements have been suggested in this report. These tasks collectively will require a large investment of time and funds.
    - For example, new sites (meeting a FSN criterion) may be identified, or counts of certain populations at a site may be higher than those already used, influencing the site's ranking.
    - A major review and clarification of site definitions and boundaries would be a key component of any update and revision (see separate recommendation).
    - Consideration of how to include more of the 78 populations, such as non-congregatory species, that did not feature in this project's results should precede any update. Special survey work may be required and/or review of the FSN criteria (any change to the criteria would require Partnership endorsement).
    - A systematic and comprehensive interrogation of major datasets on waterbird counts relevant to the EAAF would be beneficial.
        - This work is necessary because of recent (and likely future) changes in some 1% thresholds of waterbird populations (see separate recommendation).
        - Recognising the rapid and alarming changes in habitats and population sizes in the EAAFF, also that many FSN data are up to 30 years old, this work will also be needed if EAAFP decides to make an entirely fresh assessment of important sites by limiting data to a historical age of no more than, say, 15 years.
        - The work will require 6-12 months of (discontinuous) time and funding to enable data custodians to employ personnel to implement data queries requested by EAAFP.

- Before agreeing to any new work on prioritisation of candidate sites, Partners should assess the relative benefits to EAAFP including an indication of how much the new work would add value to the present products – and take action to designate high-priority sites that have been already identified.

5. SITE DEFINITIONS AND BOUNDARIES In implementing the present project, the consultant identified many limitations with the definitions, names and/or implied boundaries of sites to which count data referred. Although the relevant Government Partner will need to make its own decisions about these matters by examining original count data as part of the site nomination process, many stakeholders will benefit from development of more robust systems of knowledge about sites.
    - Specific issues to be addressed include:
        - Resources to conduct consultation among the numerous coordinators of major waterbird surveys, past and ongoing, in the EAAF.
        - Definition and mapping of boundaries of existing survey sites.
        - Agreement on any adjustment or rationalisation of boundaries and sites.
        - Creation of a single flyway-wide register of site names and boundaries.
    - Outcomes of the work will need to be promoted in the EAAF using websites of EAAFP and Partners and through workshops or bilateral consultations.
    - The logical mechanism to facilitate this work is a computerised Geographic Information System (GIS).
        - Adaptation and resourcing of existing GISs of EAAFP Partners should be considered, rather than developing a new system.
        - Ultimately, adaptation of the sophisticated Critical Site Network Tool may be a far better option because relevant layers of global geo-data are already in its GIS.
        - There will be cost, personnel and training implications if a standalone GIS or adapted Critical Site Network Tool are to be developed.
    - It may be beneficial for EAAFP to address some of the issues above as an interim or foundational step in uptake of the Critical Site Network Tool.
        - Such work may require 6-12 months of (discontinuous) time and funding to engage a consultant, if not using Secretariat staff.
        - The Partners and Secretariat will need to commit to ongoing promotion of products from that work, to achieve flyway-wide standardisation.

6. WATERBIRD POPULATIONS AND ESTIMATES OF SIZE An updated version of the list of waterbird population estimates was produced by the present project but has not yet been endorsed by the Partnership. Also, some vital tasks have been identified by the project in relation to improving knowledge of populations and estimates:
    - The list of waterbird populations and estimates and 1% thresholds developed for the project (Appendix 4) was purpose built and contains a number of features that may need adaptation for use by Partners as the new official list for developing the FSN.
        - Either directly by extracting text from the present report, or by engaging a consultant (about 3 to 5 days of work), the Secretariat should adapt the list to a form ready for endorsement by the Partners at MoP7 and provide a detailed and summary explanation of changes from the MoP2 List and salient issues.
            - Decisions need to be made regarding populations with thresholds of less than 10 birds: previously these were not assigned numerical values but were marked for assessment on a case-by-case basis.

        - If time and funds do not permit this before MoP7, the decision at MoP7 could be contingent on the task being completed in a short timeframe (within the ensuing 3 months).
    - Waterbird records need to be assigned to the correct population.
        - Where more than one population of a waterbird species occurs in a Flyway country, identification tools and/or guidance should be developed for coordinators and field observers to indicate which population should be assigned to records of the species.
            - In some cases, new research needs to be conducted to enable that guidance to be prepared.
    - Some of the estimates in WPE5 need to be greatly improved so that development of the FSN is as robust as possible.
        - Where a population has been assigned minimum and maximum estimates of size, which differ markedly in value (e.g. by an order of magnitude), major effort should be made to (ideally) derive a single numerical estimate or at least to more narrowly define the range.
        - Where a population is known to have declined substantially in recent years, but that is not reflected in WPE5, evidence should be gathered and a case made for a new estimate.
        - Where a population does not yet have an estimate, this should be rectified wherever possible, provided that the estimate is not just a broad range, e.g. one or two orders of magnitude.
        - All such work should be conducted in close consultation with data custodians and Wetlands International.
        - Outcomes should be incorporated in the 6th edition of *Waterbird Population Estimates* but could be incorporated sooner in the official EAAFP list if so desired by the Partners.
        - Funding for a consultant and contribution to unbudgeted but essential costs of the cooperating organisations, would be required; duration of work may be 6-12 months depending on scope.
    - Consultancies, in some cases of 6-12 months duration, may be necessary to substantially address one or several of the above tasks.
    - A large proportion of the data on waterbird numbers at sites in the flyway has been collated under the coordination of a few Partners.
        - Cooperation with and support to those Partners may be the most appropriate avenue to addressing issues on waterbird data that are vital to developing the FSN.
        - Some of these Partners have longstanding arrangements to supply waterbird data to other international initiatives, notably the Ramsar Convention, and such arrangements could inform suitable approaches for EAAFP.

7. SUSTAINING THE FOUNDATION AND DETECTION OF CHANGE The foundation on which the project products was built and on which detection of future changes in population viability depends, is the waterbird survey effort.
    - There is a general lack of appreciation of the unfunded efforts of large numbers of people, flyway-wide, in conducting thousands of hours of surveys, and a lack of understanding that such efforts do not have secure support for future years.
        - Financial and logistical support is needed to sustain, enhance and expand the existing waterbird survey efforts by volunteer-based organisations.
    - To address the scarcity of recent data from many sites in many countries, a fresh and systematic survey of many if not all of the ca. 1050 designated and candidate sites would be beneficial and well worth the investment cost.

- Funds also are needed to enable flyway-scale databases on waterbird count and site information to be adequately developed and managed; the data management and reporting element of survey work generally also has no secure future.
    - Optimal arrangements for continuing into future years/decades must be developed and supported.
- Greater attention should be given by EAAFP and Partners to rigorous analysis of survey data, so that possible changes in waterbird population sizes can be detected as early as possible and conservation action taken.
    - For example, it is likely that a recent, rapid and possibly catastrophic decline of Baer's Pochard has largely gone unnoticed.
- The possible role of the Secretariat's Science Officer in these matters should be discussed by the Partners and closely defined.

8. UPTAKE OF THE CRITICAL SITE NETWORK TOOL The Critical Site Network Tool has been introduced to EAAFP at previous Meetings of Partners. It seems that many if not most of the needs identified for the FSN could be catered by the Tool if extended to or adapted for the EAAF. This would avoid having to re-invent systems; software applications and training materials already exist.
    - Past inaction on pursuing this further has probably been influenced by the perceived large cost and scale of such an uptake.
        - However, many of the Tool's functions will need only minimal to modest adaptation to enable use in the EAAF.
        - A full cost-benefit analysis of the Tool's potential, informed by the experience of users in the African-Eurasian region, is likely to strongly support its uptake in the EAAF.
        - The immediate costs of the uptake may be in the order of $1 million or less, over 1 to 2 years, rather than many millions.
            - The scale of funding may be attractive and feasible to a consortium of major corporations, global facilities and Partner Governments.
            - Partner Governments could also assist via in-kind contributions, especially in relation to spatial data sets of Protected Areas (via the IUCN Protected Area Database) and Ramsar listed wetlands (via the Ramsar Convention Secretariat).
    - Rather than pursuing a number of unconnected and short term measures it may be best value-for-investment if EAAFP commits to uptake of the Critical Site Network Tool over a reasonably short time frame.
        - It is recommended that EAAFP commission a short study with terms of reference to:
            - Identify the potential benefits of the integrated Critical Site Network Tool to EAAFP.
            - Prepare an outline of the work required for uptake and an indicative timeframe and budget.
            - Provide a cost-benefit analysis, informed by existing users.
            - Develop a funding proposal and list of potential members of a funder consortium.
            - Conduct initial inquiries to potential funders.
            - Report back to Partners out-of-session so that the Secretariat may bring a ready-to-go plan of action for endorsement by Partners at the 8th Meeting of Partners.

6.4 Suggested discussion points for the next Meeting of Partners

1. IMPROVED DEFINITIONS AND BOUNDARIES OF SITES

    Suggested discussion point for MoP7: *The Partners are asked to secure adequate funding and timeframe for work to improve the definitions and boundaries of the internationally important waterbird sites (designated to the FSN and candidate) in the Flyway, including consultation among survey coordinators, preliminary mapping of site boundaries, registration of names, and promotion of the register and future use of agreed details.*

2. WATERBIRD POPULATIONS AND ESTIMATES

    Suggested discussion point for MoP7: *The Partners are asked to endorse the draft updated list of waterbird populations and estimates for the Flyway, derived from the 5th edition of Waterbird Population Estimates and replacing the list adopted at MoP2 (which was based on an older edition)*.

        Alternative wording: *The Partners are asked to endorse the draft updated list of waterbird populations and estimates for the Flyway, derived from the 5th edition of Waterbird Population Estimates and replacing the list adopted at MoP2 (which was based on an older edition). This endorsement is subject to further work that is to be coordinated by the Secretariat and completed within three months of this Meeting, on adjustment of very low 1% thresholds and clarification on particular populations identified by Partners during MoP7*.

    Suggested discussion point for MoP7: *The Partners are asked to commission work to rectify weaknesses and gaps in the new list, including transition from broad estimate ranges to single numerical values, and to provide tools for assignment of waterbird records to the correct population (wherever more than one population of a species occurs in a country); also to set a timeframe and process for adoption of these products by EAAFP*.

3. FUTURE DIRECTION FOR THE INITIATIVE

    Suggested discussion point for MoP7: *The Partners are encouraged to determine future directions for the site prioritisation initiative as recommended in the consultancy report (April 2013), including development and implementation of complementary approaches, progressing to a comprehensive update and revision of the preliminary products, and/or commissioning a feasibility study on uptake of the Critical Site Network Tool for the EAA Flyway.*

Partners are encouraged to consider all of the recommendations of this project (detailed above) and how they may implement them; also, to use the opportunities of MoP7 to ensure that necessary follow-up action does occur.

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List of Appendixes

Appendix 1. Extract from EAAFP Implementation Strategy 2012-16

Source: EAAFP Implementation Strategy 2012-16
http://www.eaaflyway.net/implementation.php, accessed 14 November 2012

Objective 1: Develop the Flyway Network of sites of international importance for the conservation of migratory waterbirds, building on the achievements of the APMWCS networks.

Outcome 1: Internationally important sites are identified for all migratory waterbirds across the Flyway, and prioritized for conservation and inclusion in the Flyway Site Network.

Explanation/observation: This outcome recognizes that the EAAFP Flyway Site Network (FSN) represents a subset of the sites (probably numbering more than 1000) that are known to meet criteria for international importance for migratory waterbirds, across the flyway. Some non-FSN sites are recognized through other designations such as Ramsar Sites and IBAs. The outcome addresses all of the internationally important sites in the flyway, prioritizing them for conservation action. Guidance on the prioritization of sites, from working groups and technical experts on waterbird distributions, is required to assist Partners achieve this outcome. The outcome also seeks to expand the FSN so that, as a minimum, all sites in the flyway that are critical for survival of populations have been included. Inclusions should have the support of the relevant site management bodies.

Key Result Area 1.1. An initial list of internationally important sites is identified based on existing information, and is communicated to all national governments of the Flyway by March 2013. A more comprehensive list of sites necessary to support the life cycles of the Flyway's waterbirds, including up-to-date information and covering all waterbird groups, is completed by 2016. (Secretariat, WGs, INGOs and/or Monitoring Task Force)

Explanation/observation: A list of sites of international importance for migratory waterbirds in the EAAF (700 sites, for just three of the species groups) based on information from working groups was presented at MoP1. This original list should be reviewed and updated (e.g. initially, with information on the number of species for which a site is important) and put on the EAAFP website. It is proposed that the more comprehensive list produced by 2016 be based on available tools. All waterbird groups (e.g. herons, terns, other seabirds) should be included, which will increase the number of sites far beyond the original list.

Potentially this work could be contracted out to one or more Partners or led by the Monitoring Task Force, and there could be a specific role for the EAAFP Science Officer.

Key Result Area 1.2. Initial guidance on the prioritization of these sites for nomination in the FSN is developed and made available to Partners by MoP7, and is reviewed/revised at each successive MoP. (Flyway: Secretariat / Consultant / Monitoring Task Force)

Explanation/observation: The nomination of sites in the FSN to date has received limited guidance on prioritization. Future site nomination needs to be guided by the strategic needs of the FSN, for example in relation to the conservation of globally threatened species, populations that are recognized to be in serious decline, inclusion

of disappearing key habitats, representation of various waterbird groups, and recognition of sites that are of outstanding importance to a wide range of migratory waterbird populations. The involvement of the EAAFP taxonomic Working Groups is needed to identify sites of importance for different species and/or groups as a basis for prioritizing nominations. This will ensure that governments are adequately informed when considering new site designations.

Potentially this guidance could be elaborated into a Strategic Plan for the FSN (similar to the Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance under the Ramsar Convention). The exercise might also be informed by the evaluation criteria being developed for the recently adopted Site Network under the CMS/IOSEA Marine Turtle Memorandum of Understanding.

This work could be commissioned by the Secretariat or led by the Monitoring Task Force.

Key Result Area 1.3. The Flyway Site Network is progressively expanded to include all critical sites identified for migratory waterbird populations (target of 7-10 new sites per year, in line with identified priorities). (National: National Government Partners)

Explanation/observation: This KRA recognizes that a systematically designed network of sites which collectively meets the migration requirements of the Flyway's 250 waterbird populations is needed, rather than simply a collection of sites that does not address all populations. Such a network will be a minimum, to be expanded. This outcome requires a strategic approach to site nomination, including prioritization of sites (see KRA 1.2). On the basis of a list of priority sites identified for waterbirds populations at a flyway level, national Partners will be in a better position to identify a national list of priority sites for inclusion in the FSN. Experience has shown that the process of site nomination is often time-demanding due to the need for consultation with a range of stakeholders at different levels, to secure the agreements needed to proceed. A relatively low and achievable target, 7-10 sites per year, has therefore been set for new nominations for the Flyway as a whole.

Appendix 2. Terms of Reference of the consultancy

Terms of Reference for the provision of scientific services to the East Asian-Australasian Flyway Partnership regarding the Flyway Site Network

Background

The East Asia – Australasian Flyway (the Flyway) is one of nine major migratory waterbird flyways around the globe. It extends from within the Arctic Circle in Russia and Alaska, southwards through East and South-east Asia, to Australia and New Zealand in the south, encompassing 22 countries. Migratory waterbirds share this flyway with 45% of the world's human population. The Flyway is home to over 50 million migratory waterbirds – including shorebirds, Anatidae (ducks, geese and swans) and cranes – from over 250 different populations, including 28 globally threatened species.

Launched in November 2006, the East Asian-Australasian Flyway Partnership (the Partnership) is an informal and voluntary initiative, aimed at protecting migratory waterbirds, their habitat and the livelihoods of people dependent upon them. There are currently 27 partners including 14 countries, 3 intergovernmental agencies, 9 international non-government organisations and one from the international business sector. The Partnership provides a framework for international cooperation, including:

- development of a Flyway Site Network (for sites of international importance to migratory waterbirds);
- collaborative activities to increase knowledge and raise awareness of migratory waterbirds along the flyway, and;
- building capacity for the sustainable management and conservation of migratory waterbird habitat along the flyway.

There are currently 700 sites recognised as internationally important to migratory waterbirds (primarily shorebirds, cranes and ducks, geese and swans) along the flyway, many of which are located adjacent to human settlement and vulnerable to rapid social and economic development pressures. Currently 108 of these sites have been nominated to the Flyway Site Network.

The Partnership's Implementation Strategy 2012-2016 which was agreed at the Sixth Meeting of Partners (Palembang, Indonesia 2012) contains Outcomes and associated Key Result Areas aimed at ensuring all important sites for migratory waterbirds in the flyway are identified, and at least the most critical of these are included in the Flyway Site Network.

Scientific Services to be provided

A short term consultancy is required for the following activities:

1. To compile available data from the Partnership Secretariat, the various Partnership species Working Groups, Partners and other sources to update the existing list of sites recognised as internationally important to migratory waterbirds along the flyway, including groups such as seabirds, herons and egrets;

2. To develop and implement criteria and a methodology to prioritise these sites for nomination to the Flyway Site Network, based on the strategic needs of the network.

Prioritisation may consider, but is not limited to, conservation of globally threatened species, populations recognised to be in serious decline, disappearing key habitats, representation of various waterbird groups, and recognition of sites that are of outstanding importance to a wide range of migratory waterbird populations;

3. Obtain feedback from EAAFP partners, Working Groups and related experts on the criteria and methodology;

4. Incorporating this feedback, undertake an exercise, using the criteria and methodology to come up with an initial prioritization of sites, for the Flyway and individual countries;

5. With the EAAFP Programme Officer, agree on the optimal way to put this data and information on the EAAFP website, that furthers the possibilities to periodically update the data and information;

6. To prepare a report on the methodology and results, including how the methodology might be used to report progress of the Flyway Site Network to each Meeting of Partners, to the Partnership Secretariat no later than 30 April 2013.

7. To present the methods and results of this study to the next Meeting of Partners to be held in Alaska during June 2013.

Appendix 3. Criteria for identification of internationally important sites in the East Asian – Australasian Flyway

Extracted from the EAAFP Partnership Document http://www.eaaflyway.net/partnership-document.php, accessed 14 November 2012.

Appendix IV – Flyway Site Network Criteria

To be considered for inclusion in the Flyway Site Network, this Partnership adopts the following criteria:

a. Convention on Wetlands (Ramsar, Iran, 1971) criteria for internationally important sites for migratory waterbirds. That is:

    Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

    Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

    Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

b. The staging criteria as applied under the Asia- Pacific Migratory Waterbird Conservation Strategy. That is:

    i. A staging site should be considered internationally important if it regularly supports 0.25% of individuals in a population of one species or subspecies of waterbirds on migration.

    ii. A staging site should be considered internationally important if it regularly supports 5,000 or more waterbirds at one time during migration.

c. Under exceptional circumstances a site can be nominated if it supports migratory waterbirds at a level or stage of their life cycle important to the maintenance of flyway populations. Justification of such nominations will be considered by the partnership on a case by case basis.

Appendix 4. List of waterbird populations in the EAA Flyway

The following list was derived from the 5th edition of *Waterbird Population Estimates* (WPE5) but modified for use in the East Asian – Australasian Flyway. It is project-specific and has not been put forward to the EAAFP for endorsement.

Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Gavia stellata	Red-throated Loon	E Asia (non-bre)	10,000	100,000	100
Gavia pacifica	Pacific Loon	E Asia	25,000	100,000	250
Tachybaptus ruficollis	Little Grebe	poggei	100,000	1,000,000	1,000
Podiceps grisegena	Red-necked Grebe	holboellii, E Asia	50,000	50,000	500
Podiceps cristatus	Great Crested Grebe	cristatus, E Asia (non-bre)	25,000	50,000	250
Podiceps auritus	Horned Grebe	auritus, E Asia (non-bre)	10,000	25,000	100
Podiceps nigricollis	Black-necked Grebe	nigricollis, E Asia (non-bre)	10,000	100,000	100
Pelecanus philippensis	Spot-billed Pelican	SE Asia	4,000	5,000	40
Pelecanus crispus	Dalmatian Pelican	E Asia	50	50	1
Phalacrocorax carbo	Great Cormorant	sinensis, E, SE Asia (non-bre)	25,000	100,000	250
Phalacrocorax capillatus	Japanese Cormorant	East Asia	25,000	100,000	250
Phalacrocorax pelagicus	Pelagic Cormorant	pelagicus	10,000	25,000	100
Phalacrocorax urile	Red-faced Cormorant	N Pacific	200,000	200,000	2,000
Ardea cinerea	Grey Heron	jouyi, E, SE Asia	100,000	1,000,000	1,000
Casmerodius albus	Eastern Great Egret	modestus, E Asia (non-bre)	10,000	100,000	100
Casmerodius albus	Eastern Great Egret	modestus, Australia	25,000	100,000	250
Mesophoyx intermedia	Intermediate Egret	intermedia, E, SE Asia	25,000	100,000	250
Mesophoyx intermedia	Intermediate Egret	plumifera	100,000	1,000,000	1,000
Ardea purpurea	Purple Heron	manilensis, E & SE Asia	10,000	100,000	100

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Bubulcus ibis	Cattle Egret	coromanda, E, SE Asia	100,000	1,000,000	1,000
Bubulcus ibis	Cattle Egret	coromanda, Oceania	25,000	1,000,000	250
Butorides striata	Striated Heron	amurensis	no estimate	no estimate	no data
Butorides striata	Striated Heron	actophila	no estimate	no estimate	no data
Ardeola bacchus	Chinese Pond-heron	E, SE & S Asia	25,000	1,000,000	250
Ardeola speciosa	Javan Pond-heron	speciosa	no estimate	no estimate	no data
Ardeola speciosa	Javan Pond-heron	continentalis	10,000	100,000	100
Ardea picata	Pied Heron	Australia - Sulawesi	25,000	100,000	250
Egretta garzetta	Little Egret	garzetta, E, SE Asia	100,000	1,000,000	1,000
Egretta garzetta	Little Egret	nigripes	25,000	1,000,001	250
Egretta garzetta	Little Egret	immaculata	25,000	100,000	250
Egretta eulophotes	Chinese Egret	E, SE Asia	3,000	4,100	30
Nycticorax nycticorax	Black-crowned Night-heron	nycticorax, E, SE Asia	100,000	1,000,000	1,000
Gorsachius magnificus	White-eared Night-heron	SE Asia	250	1,000	3
Gorsachius goisagi	Japanese Night-heron	E & SE Asia	250	1,000	3
Gorsachius melanolophus	Malaysian Night-heron	SE Asia	no estimate	no estimate	no data
Botaurus stellaris	Great Bittern	stellaris, S & E Asia (non-bre)	25,000	100,000	250
Ixobrychus sinensis	Yellow Bittern	E & SE Asia	100,000	1,000,000	1,000
Ixobrychus eurhythmus	Schrenck's Bittern	E & SE Asia	1	25,000	1
Ixobrychus cinnamomeus	Cinnamon Bittern	E, SE Asia	100,000	1,000,000	1,000
Ixobrychus flavicollis	Black Bittern	flavicollis, E, SE Asia	10,000	100,000	100
Mycteria leucocephala	Painted Stork	SE Asia	1	10,000	1
Anastomus oscitans	Asian Openbill	S, SE Asia	300,000	300,000	3,000
Ciconia nigra	Black Stork	E Asia (non-bre)	1	500	1
Ciconia boyciana	Oriental Stork	E Asia	3,000	3,000	30
Leptoptilos dubius	Greater Adjutant	Cambodia (bre)	150	200	2

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Threskiornis melanocephalus	Black-headed Ibis	SE Asia	1	10,000	1
Threskiornis molucca	Australian Sacred Ibis	(strictipennis)	25,000	1,000,000	250
Plegadis falcinellus	Glossy Ibis	falcinellus, S, SE Asia (non-bre)	10,000	25,000	100
Platalea leucorodia	Eurasian Spoonbill	(major), E Asia	10,000	10,000	100
Platalea minor	Black-faced Spoonbill	minor	1,830	2,700	18
Platalea regia	Royal Spoonbill	Australia, New Zealand	25,000	100,000	250
Anseranas semipalmata	Magpie Goose	N Australia, S New Guinea	1,000,000	1,000,001	10,000
Dendrocygna bicolor	Fulvous Whistling-duck	S Asia	50,000	50,000	500
Dendrocygna arcuata	Wandering Whistling-duck	australis	100,000	1,000,000	1,000
Dendrocygna javanica	Lesser Whistling-duck	E & SE Asia	100,000	1,000,000	1,000
Cygnus olor	Mute Swan	East Asia	1,000	3,000	10
Cygnus cygnus	Whooper Swan	E Asia	60,000	60,000	600
Cygnus columbianus	Tundra Swan	jankowskii	92,000	110,000	920
Anser cygnoides	Swan Goose	C & E Asia	60,000	78,000	600
Anser fabalis	Bean Goose	middendorffi, Okhotsk/Kamch.-Japan	6,000	10,000	60
Anser fabalis	Bean Goose	middendorffi, Yakutia/E Asia	5,000	20,000	50
Anser fabalis	Bean Goose	middendorffi, Sayan/E China	2,000	5,000	20
Anser fabalis	Bean Goose	serrirostris, Kamchatka/Japan	1,200	6,800	12
Anser fabalis	Bean Goose	serrirostris: Central & Eastern Siberia	80,000	150,000	800
Anser albifrons	Greater White-fronted Goose	frontalis, China	18,000	18,100	180
Anser albifrons	Greater White-fronted Goose	frontalis, Japan	175,000	210,000	1,750
Anser albifrons	Greater White-fronted Goose	frontalis, Korea	70,000	100,000	700
Anser erythropus	Lesser White-fronted Goose	C & E Siberia	25,000	28,000	250
Anser anser	Greylag Goose	rubrirostris, E Asia (non-bre)	50,000	100,000	500
Anser indicus	Bar-headed Goose	C, S & SE Asia	52,000	60,000	520

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Chen caerulescens	Snow Goose	caerulescens, E Asia	28	52	1
Branta canadensis	Canada Goose	leucopareia, Kuril (Ekarmar-Japan)	40	250	1
Chen canagica	Emperor Goose	N Pacific	74,200	74,200	742
Branta bernicla	Brent Goose	nigricans, China (non-bre)	2,500	5,700	25
Branta bernicla	Brent Goose	nigricans, Japan (non-bre)	2,500	3,000	25
Tadorna ferruginea	Ruddy Shelduck	E Asia (non-bre)	50,000	100,000	500
Tadorna tadorna	Common Shelduck	South Asia (non-bre)	25,000	100,000	250
Tadorna tadorna	Common Shelduck	E Asia (non-bre)	100,000	150,000	1,000
Nettapus coromandelianus	Cotton Pygmy-goose	coromandelianus, E & SE Asia	25,000	1,000,000	250
Aix galericulata	Mandarin Duck	China (non-bre)	20,000	20,000	200
Aix galericulata	Mandarin Duck	Korea (non-bre)	3,000	4,000	30
Aix galericulata	Mandarin Duck	Japan (non-bre)	40,000	40,000	400
Anas penelope	Eurasian Wigeon	E Asia (non-bre)	500,000	1,000,000	5,000
Anas falcata	Falcated Duck	C & E Asia	78,000	89,000	780
Anas strepera	Gadwall	strepera, E Asia (non-bre)	500,000	1,000,000	5,000
Anas formosa	Baikal Teal	E Asia	500,000	1,000,000	5,000
Anas crecca	Common Teal	crecca, E & SE Asia (non-bre)	600,000	1,000,000	6,000
Anas platyrhynchos	Mallard	platyrhynchos, E Asia (non-bre)	1,500,000	1,500,000	15,000
Anas poecilorhyncha	Spot-billed Duck	hartingtoni	10,000	100,000	100
Anas zonorhyncha	Eastern Spot-billed Duck	zonorhyncha	800,000	1,600,000	8,000
Anas acuta	Northern Pintail	E & SE Asia	200,000	300,000	2,000
Anas querquedula	Garganey	E & SE Asia (non-bre)	100,000	200,000	1,000
Anas clypeata	Northern Shoveler	E & SE Asia (non-bre)	500,000	500,000	5,000
Aythya ferina	Common Pochard	E Asia (non-bre)	300,000	300,000	3,000
Aythya baeri	Baer's Pochard	C, E, SE & S Asia	250	1,000	3

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Aythya nyroca	Ferruginous Duck	S, E & SE Asia (non-bre)	100,000	100,000	1,000
Aythya fuligula	Tufted Duck	E & SE Asia (non-bre)	200,000	300,000	2,000
Aythya marila	Greater Scaup	mariloides, E Asia	200,000	300,000	2,000
Somateria mollissima	Common Eider	v-nigra	130,000	170,000	1,300
Somateria spectabilis	King Eider	E Asia (bre)	no estimate	no estimate	no data
Somateria fischeri	Spectacled Eider	E Siberia, N & W Alaska	360,000	400,000	3,600
Polysticta stelleri	Steller's Eider	N Pacific (non-bre)	180,000	180,000	1,800
Histrionicus histrionicus	Harlequin Duck	(pacificus)	25,000	100,000	250
Clangula hyemalis	Long-tailed Duck	E Asia (non-bre)	500,000	1,000,000	5,000
Melanitta americana	Black Scoter	americana, E Asia	300,000	500,000	3,000
Melanitta stejnegeri	Asian White-winged Scoter	E Asia	600,000	1,000,000	6,000
Bucephala clangula	Common Goldeneye	clangula, E Asia (non-bre)	100,000	1,000,000	1,000
Mergellus albellus	Smew	E Asia (non-bre)	25,000	25,000	250
Mergus serrator	Red-breasted Merganser	E Asia (non-bre)	25,000	100,000	250
Mergus squamatus	Scaly-sided Merganser	E & SE Asia	2,400	10,000	24
Mergus merganser	Common Merganser	orientalis, E Asia (non-bre)	50,000	100,000	500
Anthropoides virgo	Demoiselle Crane	E Asia (bre)	70,000	100,000	700
Leucogeranus leucogeranus	Siberian Crane	Eastern	3,500	3,800	35
Grus antigone	Sarus Crane	sharpii, Indochina	800	1,000	8
Grus antigone	Sarus Crane	sharpii, Myanmar	500	800	5
Grus vipio	White-naped Crane	China (non-bre)	1,000	1,500	10
Grus vipio	White-naped Crane	Korea, Japan (non-bre)	4,500	5,000	45
Grus grus	Common Crane	(lilfordi), C China (non-bre)	10,000	22,000	100
Grus grus	Common Crane	(lilfordi), S China (non-bre)	1,000	1,000	10

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Grus monacha	Hooded Crane	C China (non-bre)	1,050	1,150	11
Grus monacha	Hooded Crane	Korea, Japan (non-bre)	10,500	10,500	105
Grus japonensis	Red-crowned Crane	E China (non-bre)	400	500	4
Grus japonensis	Red-crowned Crane	Korea (non-bre)	1,050	1,050	11
Coturnicops exquisitus	Swinhoe's Rail	C & E Asia	1	10,000	1
Rallina tricolor	Red-necked Crake	New Guinea, NE Australia	no estimate	no estimate	no data
Rallina fasciata	Red-legged Crake	S & SE Asia	no estimate	no estimate	no data
Rallina eurizonoides	Slaty-legged Crake	eurizonoides	no estimate	no estimate	no data
Rallina eurizonoides	Slaty-legged Crake	telmatophila	no estimate	no estimate	no data
Gallirallus striatus	Slaty-breasted Rail	albiventer	no estimate	no estimate	no data
Gallirallus striatus	Slaty-breasted Rail	gularis	no estimate	no estimate	no data
Rallus aquaticus	Water Rail	korejewi, Western Siberia/SW Asia	no estimate	no estimate	no data
Rallus aquaticus	Water Rail	indicus	no estimate	no estimate	no data
Amaurornis phoenicurus	White-breasted Waterhen	phoenicurus	100,000	1,000,001	1,000
Porzana pusilla	Baillon's Crake	pusilla	no estimate	no estimate	no data
Porzana fusca	Ruddy-breasted Crake	erythrothorax	no estimate	no estimate	no data
Porzana paykullii	Band-bellied Crake	E, SE Asia	no estimate	no estimate	no data
Gallicrex cinerea	Watercock	S, SE & E Asia	no estimate	no estimate	no data
Gallinula chloropus	Common Moorhen	chloropus, SE Asia (non-bre)	no estimate	no estimate	no data
Fulica atra	Common Coot	atra, E, SE Asia (non-bre)	100,000	1,000,001	1,000
Heliopais personatus	Masked Finfoot	S, SE Asia	2,500	10,000	25
Hydrophasianus chirurgus	Pheasant-tailed Jacana	S & SE Asia	100,000	150,000	1,000
Rostratula benghalensis	Greater Painted-snipe	Asia	10,000	25,000	100
Haematopus ostralegus	Eurasian Oystercatcher	osculans	5,000	10,000	50
Himantopus himantopus	Black-winged Stilt	himantopus, E & SE Asia	25,000	100,000	250
Himantopus leucocephalus	White-headed Stilt	SE Asia - Australia	25,000	1,000,000	250

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Recurvirostra avosetta	Pied Avocet	E Asia	100,000	100,000	1,000
Stiltia isabella	Australian Pratincole	Australia	25,000	100,000	250
Glareola maldivarum	Oriental Pratincole	E-SE Asia, Australia	2,880,000	2,880,000	28,800
Vanellus vanellus	Northern Lapwing	E, SE Asia (non-bre)	100,000	1,000,000	1,000
Vanellus cinereus	Grey-headed Lapwing	E, SE & S Asia	25,000	100,000	250
Pluvialis fulva	Pacific Golden Plover	E, SE Asia Australia & Oceania (nb)	100,000	100,000	1,000
Pluvialis fulva	Pacific Golden Plover	Pacific Islands (non-bre)	35,000	50,000	350
Pluvialis squatarola	Grey Plover	squatarola, E, SE Asia & Australia (nb)	104,000	104,000	1,040
Charadrius placidus	Long-billed Plover	E, SE & S Asia	1	25,000	1
Charadrius dubius	Little Ringed Plover	curonicus C & E Asia	25,000	25,000	250
Charadrius dubius	Little Ringed Plover	jerdoni	25,000	100,000	250
Charadrius alexandrinus	Kentish Plover	dealbatus	100,000	100,000	1,000
Charadrius bicinctus	Double-banded Plover	bicinctus	50,000	50,000	500
Charadrius mongolus	Lesser Sand Plover	mongolus	25,500	25,500	255
Charadrius mongolus	Lesser Sand Plover	atrifrons	120,000	150,000	1,200
Charadrius mongolus	Lesser Sand Plover	schaeferi	30,000	30,000	300
Charadrius mongolus	Lesser Sand Plover	stegmanni	13,000	13,000	130
Charadrius leschenaultii	Greater Sand Plover	leschenaultii, SE Asia, Australia (nb)	79,000	79,000	790
Charadrius veredus	Oriental Plover	Central Asia (bre)	145,000	155,000	1,450
Scolopax rusticola	Eurasian Woodcock	C & E Asia (bre)	25,000	1,000,000	250
Lymnocryptes minimus	Jack Snipe	E, SE Asia (non-bre)	1	10,000	1
Gallinago solitaria	Solitary Snipe	japonica	1	10,000	1
Gallinago hardwickii	Latham's Snipe	E Asia (bre)	25,000	100,000	250
Gallinago nemoricola	Wood Snipe	S & SE Asia	2,500	10,000	25
Gallinago stenura	Pintail Snipe	E & SE Asia (non-bre)	25,000	1,000,000	250

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Gallinago megala	Swinhoe's Snipe	Central Asia (bre).	25,000	100,000	250
Gallinago gallinago	Common Snipe	gallinago, E & SE Asia (non-bre)	100,000	1,000,000	1,000
Limnodromus semipalmatus	Asian Dowitcher	C & E Asia (bre)	23,000	23,000	230
Limosa limosa	Black-tailed Godwit	melanuroides	139,000	139,000	1,390
Limosa lapponica	Bar-tailed Godwit	menzbieri & (anadyrensis)	146,000	146,000	1,460
Limosa lapponica	Bar-tailed Godwit	baueri	133,000	133,000	1,330
Numenius minutus	Little Curlew	N Siberia (bre)	180,000	180,000	1,800
Numenius phaeopus	Whimbrel	variegatus, E & SE Asia (non-bre)	55,000	55,000	550
Numenius arquata	Eurasian Curlew	orientalis, E & SE Asia (non-bre)	100,000	100,000	1,000
Numenius madagascariensis	Far Eastern Curlew	C & E Asia (bre)	32,000	32,000	320
Tringa erythropus	Spotted Redshank	E, SE Asia (non-bre)	25,000	25,000	250
Tringa totanus	Common Redshank	ussuriensis, S & SE Asia (non-bre)	25,000	100,000	250
Tringa totanus	Common Redshank	terrignotae	10,000	100,000	100
Tringa totanus	Common Redshank	craggi	10,000	100,000	100
Tringa stagnatilis	Marsh Sandpiper	E, SE Asia, Oceania (non-bre)	100,000	1,000,000	1,000
Tringa nebularia	Common Greenshank	E, SE Asia, Australia (non-bre)	100,000	100,000	1,000
Tringa guttifer	Spotted Greenshank	NE Asia (bre)	400	600	4
Tringa ochropus	Green Sandpiper	E & SE Asia (non-bre)	25,000	100,000	250
Tringa glareola	Wood Sandpiper	E, SE Asia & Australia (non-bre)	100,000	100,000	1,000
Xenus cinereus	Terek Sandpiper	E, SE Asia & Australia (non-bre)	50,000	50,000	500
Actitis hypoleucos	Common Sandpiper	E & SE Asia to Oceania (non-bre)	50,000	50,000	500
Heteroscelus brevipes	Grey-tailed Tattler	C & E Siberia (bre)	44,000	44,000	440
Arenaria interpres	Ruddy Turnstone	interpres, Pacific & SE Asia (non-bre)	28,500	28,500	285
Calidris tenuirostris	Great Knot	SE Asia, Australia (non-bre)	290,000	290,000	2,900
Calidris canutus	Red Knot	piersmai	50,500	62,000	505
Calidris canutus	Red Knot	rogersi	48,500	60,000	485

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Calidris alba	Sanderling	E & SE Asia, Australia, N Zealand (nb)	22,000	22,000	220
Calidris ruficollis	Red-necked Stint	NE Siberia (bre)	315,000	315,000	3,150
Calidris temminckii	Temminck's Stint	E & SE Asia (non-bre)	10,000	100,000	100
Calidris subminuta	Long-toed Stint	Siberia (bre)	25,000	25,000	250
Calidris acuminata	Sharp-tailed Sandpiper	C & E Siberia (bre)	160,000	160,000	1,600
Calidris ferruginea	Curlew Sandpiper	E, SE Asia & Australia (non-bre)	135,000	135,000	1,350
Calidris ptilocnemis	Rock Sandpiper	tschuktschorum	50,000	50,000	500
Calidris alpina	Dunlin	kistchinskii	100,000	1,000,000	1,000
Calidris alpina	Dunlin	arcticola	353,000	674,000	3,530
Calidris alpina	Dunlin	sakhalina	100,000	1,000,000	1,000
Calidris alpina	Dunlin	actites	900	900	9
Eurynorhynchus pygmeus	Spoon-billed Sandpiper	E Siberia (bre)	140	480	1
Limicola falcinellus	Broad-billed Sandpiper	sibirica	25,000	25,000	250
Phalaropus lobatus	Red-necked Phalarope	NE Asia (bre)	100,000	1,000,000	1,000
Larus crassirostris	Black-tailed Gull	E Asia	1,050,000	1,050,000	10,500
Larus canus	Mew Gull	kamtschatschensis	25,000	100,000	250
Larus glaucescens	Glaucous-winged Gull	N Pacific	570,000	570,000	5,700
Larus hyperboreus	Glaucous Gull	pallidissimus	no estimate	no estimate	no data
Larus argentatus	Herring Gull	vegae	no estimate	no estimate	no data
Larus argentatus	Herring Gull	mongolicus	57,000	66,000	570
Larus schistisagus	Slaty-backed Gull	NE Asia	25,000	1,000,000	250
Larus brunnicephalus	Brown-headed Gull	Central Asia (bre)	100,000	200,000	1,000
Larus ridibundus	Black-headed Gull	E & SE Asia (non-bre)	100,000	1,000,001	1,000
Larus saundersi	Saunders's Gull	NE Asia (bre)	7,100	9,600	71
Larus relictus	Relict Gull	C Asia (bre)	12,000	12,000	120
Rissa tridactyla	Black-legged Kittiwake	pollicaris, W Pacific (bre)	4,800,000	4,800,001	48,000

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Sterna nilotica	Gull-billed Tern	addenda	10,000	100,000	100
Sterna nilotica	Gull-billed Tern	affinis	no estimate	no estimate	no data
Sterna caspia	Caspian Tern	E & SE Asia (non-bre)	10,000	25,000	100
Sterna bengalensis	Lesser Crested Tern	torresii	25,000	100,000	250
Sterna bernsteini	Chinese Crested Tern	E China (bre)	1	50	1
Sterna bergii	Great Crested Tern	cristata	100,000	1,000,000	1,000
Sterna dougallii	Roseate Tern	bangsi, SE Asia	44,000	44,000	440
Sterna dougallii	Roseate Tern	korustes	1	10,000	1
Sterna dougallii	Roseate Tern	gracilis	90,000	90,000	900
Sterna striata	White-fronted Tern	striata	1,500,000	1,500,000	15,000
Sterna striata	White-fronted Tern	incerta	180	180	2
Sterna hirundo	Common Tern	Western Asia (bre)	25,000	1,000,000	250
Sterna hirundo	Common Tern	tibetana	10,000	100,000	100
Sterna hirundo	Common Tern	minussensis	no estimate	no estimate	no data
Sterna hirundo	Common Tern	longipennis	30,000	70,000	300
Sterna paradisaea	Arctic Tern	N North America (bre)	1,000,000	1,000,001	10,000
Sterna vittata	Antarctic Tern	bethunei	3,000	3,000	30
Sterna albifrons	Little Tern	pusilla	50,000	100,000	500
Sterna albifrons	Little Tern	sinensis	10,000	100,000	100
Sterna albifrons	Little Tern	placens	10,000	10,000	100
Sterna acuticauda	Black-bellied Tern	S & SE Asia	10,000	25,000	100
Sterna aleutica	Aleutian Tern	N Pacific (bre)	17,000	20,000	170
Sterna anaethetus	Bridled Tern	anaethetus	100,000	1,000,000	1,000
Sterna anaethetus	Bridled Tern	(rogersi)	no estimate	no estimate	no data
Sterna anaethetus	Bridled Tern	(novaehollandiae)	no estimate	no estimate	no data

Appendix 4 cont. Scientific name	Common name	Population name	Minimum Estimate WPE5	Maximum Estimate WPE5	Project 1 % threshold
Sterna fuscata	Sooty Tern	Red Sea Gulf of Aden E to Pacific	18,000,000	18,000,000	180,000
Sterna fuscata	Sooty Tern	infuscata	no estimate	no estimate	no data
Sterna fuscata	Sooty Tern	serrata	1,200,000	1,500,000	12,000
Chlidonias hybrida	Whiskered Tern	swinhoei	no estimate	no estimate	no data
Chlidonias hybrida	Whiskered Tern	fluviatilis	100,000	1,000,000	1,000
Chlidonias leucopterus	White-winged Tern	Asia, Australasia	100,000	1,000,000	1,000
Anous stolidus	Brown Noddy	pileatus	1,000,000	1,000,001	10,000
Anous minutus	Black Noddy	minutus	1,000,000	1,000,001	10,000
Anous minutus	Black Noddy	worcesteri	no estimate	no estimate	no data

Appendix 5. A sample of the updated list of candidate sites for possible nomination to the Flyway Site Network

site: country or territory	site name	waterbird population	waterbird count (highest recorded)	date of record	source of record: secondary	source of record: primary
Australia	Adelaide River Floodplain	Black-tailed Godwit, melanuroides	2,000	16-Jul-96	SSO	Chatto 2003
Australia	Albany Harbours	Curlew Sandpiper, E, SE Asia & Australia (non-bre)	2,054	01-Jan-96	SSO	AWSG 2003
Australia	Albany Harbours	Red-necked Stint, NE Siberia (bre)	4,742	01-Jan-95	SSO	AWSG 2003
Australia	Anderson Inlet	Double-banded Plover, bicinctus	550	07-Apr-82	SSO	AWSG 2003
Australia	Anderson Inlet	Red-necked Stint, NE Siberia (bre)	5,000	01-Jan-93	SSO	AWSG 2003
Australia	Anderson Inlet	Sharp-tailed Sandpiper, C & E Siberia (bre)	2,530	22-Feb-81	SSO	AWSG 2003
Australia	Anna Plains	Little Curlew, N Siberia (bre)	12,000	31-Mar-85	SSO	Jaensch 1989b
Australia	Anson Bay, south	Black-tailed Godwit, melanuroides	1,600		SSO	Chatto 2003
Australia	Ashmore Reef	Greater Sand Plover, leschenaultii, SE Asia, Australia (	1,295	02-Feb-03	SSO	Swann 2003b
Australia	Ashmore Reef	Grey Plover, squatarola, E, SE Asia & Australia (non-bı	1,475	02-Feb-03	SSO	Swann 2003b
Australia	Ashmore Reef	Grey-tailed Tattler, C & E Siberia (bre)	1,593	02-Feb-03	SSO	Swann 2003b
Australia	Ashmore Reef	Ruddy Turnstone, interpres, Pacific & SE Asia (non-bre	2,230	24-Oct-01	SSO	Swann 2001
Australia	Ashmore Reef	Sanderling, E & SE Asia, Australia, New Zealand (non-	1,132	02-Feb-03	SSO	Swann 2003b
Australia	Astrelba Downs National Park	Australian Pratincole, Australia	1,000	10-Aug-00	SSO	BA 2001a
Australia	Bar Plain saltmarsh, St Lawrence	Marsh Sandpiper, E, SE Asia, Oceania (non-bre)	1,553	28-Mar-07		Melzer at al. 2008
Australia	Bar Plain saltmarsh, St Lawrence	Sharp-tailed Sandpiper, C & E Siberia (bre)	3,050	28-Mar-07		Melzer at al. 2008
Australia	Barrow Island	Greater Sand Plover, leschenaultii, SE Asia, Australia (	1,158	NB, 2003-4?		Bamford & Moro 2011
Australia	Barrow Island	Grey-tailed Tattler, C & E Siberia (bre)	2,634	12-Jan-04	SSO	Bamford 2004
Australia	Barrow Island	Red-necked Stint, NE Siberia (bre)	7,611	04-Oct-03	SSO	Bamford 2004
Australia	Barrow Island	Ruddy Turnstone, interpres, Pacific & SE Asia (non-bre	1,733	10-Mar-04	SSO	Bamford 2004
Australia	Beachport NP	Sanderling, E & SE Asia, Australia, New Zealand (non-	293	27-Feb-81	SSO	AWSG 2003
Australia	Bilpa Morea Clayan (Channel Country)	White-winged Tern, Asia, Australasia	1,875	Apr-09		Reid et al. 2009
Australia	Blanche Point	Sanderling, E & SE Asia, Australia, New Zealand (non-	266	12-Nov-98	SSO	Bryant 2002
Australia	Blue Mud Bay	Black-tailed Godwit, melanuroides	4,000	15-Sep-96	SSO	Chatto 2003
Australia	Botany Bay, Sydney	Common Tern, longipennis	1,000	31-Dec-81		Higgins & Davies 1996
Australia	Boucat Bay	Black-tailed Godwit, melanuroides	5,000	25-Mar-99	SSO	Chatto 2003
Australia	Boucat Bay	Great Knot, SE Asia, Australia (non-bre)	5,500	25-Mar-99	SSO	Chatto 2003
Australia	Boullanger Bay/Robbins Passage	Curlew Sandpiper, E, SE Asia & Australia (non-bre)	3,400	01-Jan-95	SSO	AWSG 2003
Australia	Boullanger Bay/Robbins Passage	Double-banded Plover, bicinctus	1,200	01-Jun-94	SSO	AWSG 2003

NOTE: This is an extract from sheet 13 'Arranged by site – 2' of file File 1_candidate FSN sites_updated 2013_arr. by waterbird & site.xlsx which has 3085 rows of data.

Appendix 6. A sample of results from the prioritisation process arranged by country and site

country or territory	site name	PC1: index of site's contribution to the FSN	PC2: number of populations at project's 1% or 0.25% level	PC3: number of threatened species recorded at site (at project's 1% or 0.25% level)
Australia	Adelaide River Floodplain	1.44	1	0
Australia	Albany Harbours	3.03	2	0
Australia	Anderson Inlet	4.27	3	0
Australia	Anna Plains	6.67	1	0
Australia	Anson Bay, south	1.15	1	0
Australia	Ashmore Reef	19.65	5	0
Australia	Astrelba Downs National Park	1.00	1	0
Australia	Bar Plain saltmarsh, St Lawrence	2.06	2	0
Australia	Barrow Island	15.95	4	0
Australia	Beachport NP	1.33	1	0
Australia	Bilpa Morea Clayan (Channel Country)	0.19	1	0
Australia	Blanche Point	1.21	1	0
Australia	Blue Mud Bay	2.88	1	0
Australia	Botany Bay, Sydney	1.43	1	0
Australia	Boucat Bay	5.49	2	1
Australia	Boullanger Bay/Robbins Passage	18.74	4	0
Australia	Brown Bay (Green Point)	5.03	1	0
Australia	Buckingham Bay	6.50	2	1
Australia	Burdekin River delta	4.00	1	0
Australia	Bynoe Harbour	2.14	2	0
Australia	Cairns Foreshore	1.87	1	0

NOTE: This is an extract from sheet 24 ‘All results by site’ of file File 2_candidate FSN sites_updated 2013_prioritised by 3 criteria.xlsx which has 1031 rows of data.

Appendix 7A. Tables of prioritisation results (sites in top classes of the results) arranged by country, in descending order: Prioritisation criterion 1 (index = sum of % of population size, for all populations)

Sites in red font have already been designated in the Flyway Site Network.

site name: **AUSTRALIA**	class: (from applying PC1)	comments:
Eighty Mile Beach	Class 1	
Roebuck Bay		
SE Gulf of Carpentaria		
Kakadu National Park		
Houtman Abrolhos		
Port Hedland Saltworks		
Capricorn & Bunker Group of cays, GBReef		
Great Sandy Strait		
Pumicestone Passage, Caloundra		
Lake MacLeod		
Noosa River mouth	Class 2	
Moreton Bay		
Shoalwater Bay and Broad Sound		
Swain Reefs		
Corner Inlet		
The Coorong and Coorong NP		
Roebuck Plains		
Western Port Phillip Bay		
Lake Cawndilla		
Lake Gregory		
Saunders Islet	Class 3	
Ashmore Reef		
Boullanger Bay/Robbins Passage		
Shallow Inlet/Sandy Point		
Barrow Island		
Parry floodplain, Wyndham		
Chambers Bay		
Mipia-Machattie floodplain wetlands (Georgina Channel Country)		
Lake Argyle		
Hunter Estuary		
site name: BANGLADESH	**class: (from applying PC1)**	**comments:**
Tangua Haor Complex	Class 1	
Pashua Haor		
Hakaluki Haor		
Maulavir Char		
Nijum Dweep		
Noakhali		
Kalkinir Char		
Char Piya		
Urir Char		

Dhal Char Main	Class 2	
Shonir (Sanir) Haor		
Sonadia & Moheskhali Island		
Shahjalal Char		
Hatiya Island		
Monpura, West Coast		
Damar Char (near Nijhum Dweep)		
Kanamaiya Haor & Pakertala Bil		
Chatidhara (Chatidhora) Beel		
site name: **BRUNEI**	**class: (from applying PC1)**	**comments:**
		No class assigned - both sites had a low index
site name: **CAMBODIA**	**class: (from applying PC1)**	**comments:**
Prek Toal	Class 1	
Ang Trapeang Thmor Reservoir (Sarus Res)		
Krous Krom (Kruos Kraoum)		
Boeng Chhma		
Kulen Promtep Wildlife Sanctuary		
Kampot To Chhak Kep (Vietnam Border)	Class 2	
Stoeng Kampong Smach		
Moat Khla (Stoeng Viel Tong)		
Prek Kal		
Koh Kong (Kaoh Kapik)		
site name: **CHINA**	**class: (from applying PC1)**	**comments:**
Poyang Lake (includes component lakes)	Class 1	
Yancheng Nature Reserve (whole coast)		Results may be overstated.
East Dongting Lake Nature Reserve		
North Bo Hai Wan		
Shengjin Lake Nature Reserve		
Huang He (Yellow River) Delta NR		
Deep Bay (includes Mai Po & Futian NR)		
Shuangtaizihekou NNR		
Beidaihe Coast		
Jiangsu Coast		May overlap with Yancheng.
Wenzhou Wan	Class 2	
Caohai Nature Reserve		
Jiazhou Wan (Jiaozhou Bay, Qingdao)		
Anqingyanjiang NR: Wuchang Hu		
Anqingyanjiang NR: Caizi Hu		
Qing Dao		
Melmeg (Momoge) Nature Reserve		
Yalu Jiang NNR		
Ordos Uplands (several lakes)		
Beidagang		

Xingkai Lake (Xingkai Hu) Nature Reserve	Class 3	
Longgan Hu		
Huize Daqiao Nature Reserve		
Hongjian Nur (Ordos Uplands)		
Rudong Coast (Mudflats)		
Huize County		
Tianjin Coast (several components))		Some parts now landfilled.
Gaoyou and Shabo Lakes		
South-west Bo Hai Wan		
North-west Bo Hai Wan		
site name: **INDONESIA**	**class: (from applying PC1)**	**comments:**
Banyuasin Delta (includes Sembilang NP)	Class 1	
Pantai Sejara (Asahan regency)		
Bagan Percut		
Kuala Tungal to Tanjung Djabung coast		
Wasur National Park		
Benoa Bay	Class 2	
Pantai Ancol		
Pantai Trisik		
Danau Tempe (Lake Tempe)		
Bagan Serdang		
site name: **JAPAN**	**class: (from applying PC1)**	**comments:**
Izumi	Class 1	
Furen-ko (includes Shunkuni-tai)		
Hachirou-Gata (includes Rice Fields)		
Notsuke Bay		
Lake Miyajimanuma		
Lake Izunuma, Lake Uchinuma		
Kejo-numa		
Otomonuma Reservoir		
Sanbanze, Tokyo Bay		Present status to be confirmed.
Kabukuri-Numa (Kabukuri Pond)		
Lake Fukushimagata		
Hukushima Innings	Class 2	
Atsuma Rice Fields		
Mogami River		
Lake Fukurojinuma		
Lake Nakaumi		inc. Yonago-mizudori-kouen
Sa-Kata (Sagata-Kamisagata-Mitaraigata)		
Mouth of the Toyokawa		
Hakodate-Wan		
Lake Toyanogata		

Shio-kawa Higata	Class 3	
Mawarizeki Reservoir		
Isahaya Higata, Isahaya Bay		
Kushiro Marsh		
Lake Utonai		
Lake Biwa-ko		
Hanamaki Rice Fields		
Lake Kuccharo-ko		
Lake Tofutsu-ko		
site name: **MALAYSIA**	**class: (from applying PC1)**	**comments:**
Kapar Power Station (NC Selangor Coast)	Class 1	Future of site is uncertain.
Pulau Bruit, Sarawak		Habitat at site has changed.
Pulau Tengah (Klang Islands)		
Kuala Samarahan to Kuala Sadong		
Kuala Bekah (Telok Air Tawar)-Kuala Muda		
Sungai Nibong (NC Selangor Coast)		
Papar, Sabah		
Bako-Buntal Bay (and suurounding areas)	Class 2	
Tanjong Bidadari, Sabah		
Tanjung Karang (NC Selangor coast)		
Kuala Kedah to Kuala Sungai		
site name: **MONGOLIA**	**class: (from applying PC1)**	**comments:**
Buir Nuur (includes Bayan N. & Khalkh delta)	Class 1	
Uldze (Ulz) River Basin		
Khurkh-Khuiten Valley		
Khukh Nuur to Yakhi Nuur		
Dashinchilen Tsagaan wetlands		
site name: **MYANMAR**	**class: (from applying PC1)**	**comments:**
Irrawaddy R: Myitkyina - Pammate - Sinbo	Class 1	
Indawgyi Lake		
Gulf of Martaban		Some overlap with other sites.
Yaimaw (Waimaw)		
Sahmaw		
Mogaung R: Mogaung (N & S) –Samo	Class 2	
Myittha Lakes: Yewai & Yit Lakes		
Yemyetkyi Inn		
Minhla-Nyaung Yan Lake		
Inle (Inlay) Lake (includes Wildlife Sanctuary)		
site name: **NEW ZEALAND**	**class: (from applying PC1)**	**comments:**
Farewell Spit	Class 1	
Manukau Harbour		
Kaipara Harbour		
Parengarenga Harbour		
Firth of Thames		

Whangarei Harbour	Class 2	
Rangaunu Harbour		
site name: **NORTH KOREA**	**class: (from applying PC1)**	**comments:**
Mundok Migratory Bird Wetland Reserve	Class 1	
Anpyong Plain		
Kumya Plain (including Kumya Reserve)		
Tok-do Island		
site name: **PAPUA NEW GUINEA**	**class: (from applying PC1)**	**comments:**
Tonda Wildlife Management Area	Class 1	
site name: **PHILIPPINES**	**class: (from applying PC1)**	**comments:**
Leyte near Ormoc City	Class 1	
Manila Bay		
Mahaba, Calituban, Banacon, etc. islets		
Olango Island (includes Wildlife Sanctuary)		
Cordova Wetland	Class 2	
Puerto Princesa		
Bubuahan Island		
Naujan Lake National Park		
Mainit Lake		
site name: **RUSSIA**	**class: (from applying PC1)**	**comments:**
Moroshechnaya River Estuary	Class 1	
Daursky Nature Reserve (Torey Lakes)		
Kolyma Lowlands		
Lake Bolon		
Zeya - Bureya Lowland		
Utkholok NR		
Malamvayam Lagoon (Geese Lagoon NR)		
Lososei Bay		
Wrangel Island		
Kharchinskoe Lake		
Anadyr Lowlands	Class 2	
South-West Tundra NR		
Odoptu Gulf		
Selenga Delta in Lake Baikal		
Schastiya Bay		
Tugurskiy Bay		
Yana-Indigirka Tundra		
Kronotsky Nature Reserve		
Tuman Estuary		
site name: **SINGAPORE**	**class: (from applying PC1)**	**comments:**
Sungei Buloh Nature Park		No class assigned - site has a low index

site name: **SOUTH KOREA**	class: (from applying PC1)	comments:
Geum River Estuary (lake, tidal flats, island)	Class 1	Site includes Yubu Island.
Cheorwon Basin		
Mangyung (Mankyung) River Estuary		Site now radically altered.
Dongjin (Tongjin) River Estuary		Site now radically altered.
Han River (Han-gang) Estuary		
Nakdong Estuary		
Asan Bay, Asan Lake and Sapkyo Lake		Need to confirm site condition.
Yubu Island		Overlap with Geum R. Estuary.
Cheonsu Bay (includes lakes & ricefields)		
Namyang Bay		Need to confirm site condition.
Junam Reservoirs (3 components)	Class 2	
Ganghwa Island (includes southern flats)		
Hamduck-Pyoseon Coast		
Yeongam Lake		
Sihwa Lake (Reservoir)		Parts of site will be developed.
Suncheon Bay		
Yeoncheon		
Yeongjong (Yong Jong) Island		
Songdo (Song Do) Tidal Flat		Site very reduced, by landfill
Imjin River Estuary		
Janghang Reservoir (Estuary)	Class 3	
Dongrim (Dongnim) Reservoir		
Gocheonam Reservoir		
Gumi Haepyung		Present status to be confirmed.
Gwangyang and Galsa Bay		
Seogwipo (Seoquipo)-Anduck Coast		
Youngsan Reservoir & Estuary		
Seongam Reservoir		
Sinchon-Jongdal Coast		
Daeho Lake		
site name: **THAILAND**	**class: (from applying PC1)**	**comments:**
Beung Boraphet	Class 1	
Inner Gulf of Thailand		
Lower Central Plains		
Wat Phai Lom - Wat Amphuwararam Nha		
Nong Nam Khao Non-Hunting Area		
Kasetsart University (Kampaengsaen)	Class 2	
Khao Sam Roi Yot National Park		
Krabi Estuary and Bay		
Beung Khong Long		
Bung Cha-Vak, Cha-Vak Lake		
site name: **TIMOR LESTE**	**class: (from applying PC1)**	**comments:**
Timor	Class 1	

site name: **USA**	class: (from applying PC1)	comments:
Yukon-Kuskokwim Delta	Class 1	
Alaska Peninsula		
Pribilof Islands		
site name: **VIETNAM**	**class: (from applying PC1)**	**comments:**
Tram Chim National Park	Class 1	
Xuan Thuy Ramsar Site		
Hoa Trinh		
Tien Lang District		

Appendix 7B. Tables of prioritisation results (sites in top classes of the results) arranged by country, in descending order: Prioritisation criterion 2 (no. of populations recorded at 1% or 0.25% level)

Sites are included in the list if more than two applicable populations were recorded.
Sites in red font have already been designated in the Flyway Site Network.

site name: **AUSTRALIA**	**class: (from applying PC2)**	**comments:**
Eighty Mile Beach	Class 1	
Roebuck Bay		
SE Gulf of Carpentaria		
Chambers Bay		
Moreton Bay		
Great Sandy Strait		
Corner Inlet		
Hunter Estuary		
Milingimbi coast		
Port Hedland Saltworks		
Port McArthur		
Shoalwater Bay and Broad Sound		
Ashmore Reef	Class 2	
Fog Bay		
Kakadu National Park		
Shallow Inlet/Sandy Point		
Western Port		
Western Port Phillip Bay		
Barrow Island		
Boullanger Bay/Robbins Passage		
Ceduna Bays		
Lake Yamma Yamma		
Mipia-Machattie floodplain wetlands		
The Coorong and Coorong NP		
site name: **BANGLADESH**	**class: (from applying PC2)**	**comments:**
Tangua Haor Complex	Class 1	
Hakaluki Haor		
Maulavir Char		
Pashua Haor		
Char Piya		
Nijum Dweep		
Shonir (Sanir) Haor		
Sonadia & Moheskhali Island		
site name: **BRUNEI**	**class: (from applying PC2)**	**comments:**
		No class assigned - both sites had a low number of populations

site name: **CAMBODIA**	class: (from applying PC2)	comments:
Ang Trapeang Thmor Reservoir (Sarus Res)	Class 1	
Prek Toal		
site name: **CHINA**	**class: (from applying PC2)**	**comments:**
Yancheng Nature Reserve (whole coast)	Class 1	Results may be overstated.
Poyang Lake (includes component lakes)		
Huang He (Yellow River) Delta NR		
Deep Bay (includes Mai Po & Futian NR)		
Shengjin Lake Nature Reserve		
East Dongting Lake Nature Reserve		
Dongsha Islands		
Shi Jiu Tuo/Daqing He		
Shuangtaizihekou NNR		
Chongming Dongtan		
North-west Bo Hai Wan	Class 2	
Yalu Jiang NNR		May overlap with site Dandong.
Gaoyou and Shabo Lakes		
North Bo Hai Wan		
Anqingyanjiang NR: Caizi Hu		
Xingkai Lake (Xingkai Hu) Nature Reserve		
Dandong area (4 sites, mostly E & N of Y. J.)		May overlap with Yalu Jiang site.
Lianyungang Coast (Linhonghe Kou, Haizhou)		
Anqingyanjiang NR: Wuchang Hu		
North and North-west Bo Hai Wan (Combined)		
Laizhou Wan	Class 3	
Sheyang Salt Works		
South Bo Hai Wan		
Jiazhou Wan (Jiaozhou Bay, Qingdao)		
Beidagang		
Dalai Hu (Dalai Lake) NNR		
Linghekou		
site name: **INDONESIA**	**class: (from applying PC2)**	**comments:**
Banyuasin Delta (includes Sembilang NP)	Class 1	
Bagan Percut		
Kuala Tungal to Tanjung Djabung coast		
Pantai Ancol		
Pantai Sejara (Asahan regency)		
Wasur National Park		
site name: **JAPAN**	**class: (from applying PC2)**	**comments:**
Furen-ko (includes Shunkuni-tai)	Class 1	
Notsuke Bay		
Isahaya Higata, Isahaya Bay		
Shio-kawa Higata		
Hachirou-Gata (includes Rice Fields)		
Komuke-ko		

Arao Kaigan	Class 2	
Daijugarami		
Kahokugata (Kahokugata Rice Fields)		
Kasumigaura Nangan, Sakuragawa-mura		
Lake Biwa-ko		
Otomonuma Reservoir		
Sanbanze, Tokyo Bay		Need to confirm status of site.
Shira-Kawa Kakou		
Sone Higata		
Wajiro Higata		
Yatsu Higata		
Fujimae Higata	Class 3	
Kabukuri-Numa (Kabukuri Pond)		
Kamisu-Chou Takahama		
Kasai Kaihinkouen		
Kuma-gawa Kakou		
Lake Fukurojinuma		
Lake Miyajimanuma		
Lake Nakaumi		inc. Yonago-mizudori-kouen
Mogami River		
Shinji Lake (Shinji-Ko)		
Shiraho, Miyara-wan		
Takamatsu, Kahoku Kaigan		
Usa Kaigan		
site name: **MALAYSIA**	**class: (from applying PC2)**	**comments:**
Kapar Power Station (on NC Selangor Coast)	Class 1	Future of site is uncertain.
Pulau Bruit, Sarawak		Habitat at site has changed.
Pulau Tengah (Klang Islands)		
Kuala Bekah (Telok Air Tawar)-Kuala Muda		
Kuala Samarahan to Kuala Sadong		
Bako-Buntal Bay (and suurounding areas)	Class 2	
Kuala Kedah to Kuala Sungai		
site name: **MONGOLIA**	**class: (from applying PC2)**	**comments:**
Buir Nuur (includes Bayan N. & Khalkh delta)	Class 1	
Khurkh-Khuiten Valley		
Uldze (Ulz) River Basin		
Khukh Nuur to Yakhi Nuur		
site name: **MYANMAR**	**class: (from applying PC2)**	**comments:**
Gulf of Martaban	Class 1	Some overlap with other sites.
Irrawaddy Delta (has several components)		
Indawgyi Lake		
Irrawaddy R: Myitkyina - Pammate - Sinbo		
Minhla-Nyaung Yan Lake		
Chindwin R.: Kalewa - Hkamti and to north	Class 2	
Moyingyi Wetland Sanctuary		
Inle (Inlay) Lake (includes Wildlife Sanctuary)		
Let Khoke Kone (Letkok Kon)		

site name: **NEW ZEALAND**	class: (from applying PC2)	comments:
Farewell Spit	Class 1	
Kaipara Harbour		
Manukau Harbour		
Parengarenga Harbour		
Rangaunu Harbour	Class 2	
Tauranga Harbour		
Whangarei Harbour		
site name: **NORTH KOREA**	**class: (from applying PC2)**	**comments:**
Mundok Migratory Bird Wetland Reserve	Class 1	
Kumya Plain (including Kumya Reserve)		
site name: **PAPUA NEW GUINEA**	**class: (from applying PC2)**	**comments:**
Kikori Delta	Class 1	
site name: **PHILIPPINES**	**class: (from applying PC2)**	**comments:**
Manila Bay	Class 1	
Olango Island (includes Wildlife Sanctuary)		
site name: **RUSSIA**	**class: (from applying PC2)**	**comments:**
Daursky Nature Reserve (Torey Lakes)	Class 1	
Moroshechnaya River Estuary		
Kharchinskoe Lake		
Lososei Bay		
Lake Bolon		
Schastiya Bay		
Odoptu Gulf		
Lake Evoron		
Selenga Delta in Lake Baikal		
Tugurskiy Bay		
Zeya - Bureya Lowland		
Anadyr Lowlands	Class 2	
Penzhina River mouth		
Babushkina Bay		
Kolyma Lowlands		
Shantar Islands		
site name: **SINGAPORE**	**class: (from applying PC2)**	**comments:**
		No class assigned - the single site had a low number of populations

site name: **SOUTH KOREA**	class: (from applying PC2)	comments:
Nakdong Estuary	Class 1	
Dongjin (Tongjin) River Estuary		Habitat has radically changed.
Geum River Estuary (lake, tidal flats, island)		Includes Yubu Island site.
Mangyung (Mankyung) River Estuary		Habitat has radically changed.
Namyang Bay		Need to confirm status of site.
Asan Bay, Asan Lake and Sapkyo Lake		Need to confirm the condition of tidal habitat at this site
Han River (Han-gang) Estuary		
Yeongjong (Yong Jong) Island		
Cheonsu Bay (includes lakes and ricefields)		
Ganghwa Island (includes southern tidal flats)		
Sihwa Lake (Reservoir)	Class 2	Parts of site will be developed.
Songdo (Song Do) Tidal Flat		Site reduced in extent by landfill.
Suncheon Bay		
Yubu Island		Overlaps with Geum R Estuary.
Aphae Island		
Junam Reservoirs (3 components)		
Youngsan Reservoir & Estuary		
Daebu Island		
Seosan		
Cheorwon Basin	Class 3	
Gwangyang and Galsa Bay		
Imjin River Estuary		
Sokcho-Gangseong Coast		
Daeho Lake		
Daesong-dong, Panmunchom Marsh		
Geumho Reservoir		
Gocheonam Reservoir		
Gumi Haepyung		Need to confirm status of site.
Nakdong River Lower		
Sekmun (Seokmun) Reclaimed Area		
Seongam Reservoir		
site name: **THAILAND**	**class: (from applying PC2)**	**comments:**
Inner Gulf of Thailand	Class 1	
Pattani Bay		
Beung Boraphet		
Khao Sam Roi Yot National Park		
Krabi Estuary and Bay	Class 2	
Nong Han Kumphawapi		
Nong Nam Khao Non-Hunting Area		
site name: **TIMOR LESTE**	**class: (from applying PC2)**	**comments:**
		No class assigned - the single site had a low number of populations

site name: **USA**	class: (from applying PC2)	comments:
Yukon-Kuskokwim Delta	Class 1	
site name: **THAILAND**	**class: (from applying PC2)**	**comments:**
Xuan Thuy Ramsar Site	Class 1	
Tien Lang District		
Tram Chim National Park		
Hoa Trinh		
Thai Thuy		

Appendix 7C. Tables of prioritisation results (sites in top classes of the results) arranged by country, in descending order: Prioritisation criterion 3 (number of threatened species recorded at the site)

Sites are included in the list if more than two applicable populations were recorded.
Sites in red font have already been designated in the Flyway Site Network.

site name: **AUSTRALIA**	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: **BANGLADESH**	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: **BRUNEI**	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: **CAMBODIA**	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: **CHINA**	**class: (from applying PC3)**	**comments:**
Yancheng Nature Reserve (whole coast)	Class 1	Results may be overstated.
Huang He (Yellow River) Delta NR		
Poyang Lake (includes component lakes)		
Deep Bay (includes Mai Po & Futian NR)		
East Dongting Lake Nature Reserve		
Shengjin Lake Nature Reserve		
Chongming Dongtan		
Anqingyanjiang NR: Caizi Hu	Class 2	
Beidagang		
Beidaihe Coast		
Dandong area (4 sites, mostly E & N of Y.J.)		May overlap with Yalu Jiang site.
Dongsha Islands		
Gaoyou and Shabo Lakes		
Shi Jiu Tuo/Daqing He		
Shuangtaizihekou NNR		
Xingkai Lake (Xingkai Hu) Nature Reserve		

Chen Hu	Class 3	
Hannan Hu (Hannan Lake)		
Heigangkuo (Yellow River Delta)		
Melmeg (Momoge) Nature Reserve		
Minjiang River Estuary		
North Bo Hai Wan		
Qing Dao		
Rudong Coast (Mudflats)		
Wenzhou Wan		
Yalu Jiang NNR		May overlap with site Dandong.
site name: **INDONESIA**	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: **JAPAN**	**class: (from applying PC3)**	**comments:**
Isahaya Higata, Isahaya Bay	Class 1	
site name: **MALAYSIA**	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: **MONGOLIA**	**class: (from applying PC3)**	**comments:**
Uldze (Ulz) River Basin	Class 1	
site name: **MYANMAR**	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: **NORTH KOREA**	**class: (from applying PC3)**	**comments:**
Mundok Migratory Bird Wetland Reserve	Class 1	
site name: **PAPUA NEW GUINEA**	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: **PHILIPPINES**	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: **RUSSIA**	**class: (from applying PC3)**	**comments:**
Moroshechnaya River Estuary	Class 1	
Zeya - Bureya Lowland		

site name: **SINGAPORE**	class: (from applying PC3)	comments:
		No class assigned - all sites had less than 3 populations
site name: SOUTH KOREA	**class: (from applying PC3)**	**comments:**
Ganghwa Island (includes southern tidal flats)	Class 1	
Dongjin (Tongjin) River Estuary		Habitat radically changed.
Mangyung (Mankyung) River Estuary		Habitat radically changed.
Nakdong Estuary		
Namyang Bay		Need to confirm site condition.
Songdo (Song Do) Tidal Flat		Site reduced in extent by landfill.
Yeongjong (Yong Jong) Island		
Asan Bay, Asan Lake and Sapkyo Lake		Need to confirm site condition.
Geum River Estuary (lake, tidal flats, island)		Includes Yubu Island site.
Han River (Han-gang) Estuary	Class 2	
Imjin River Estuary		
Suncheon Bay		
site name: THAILAND	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: TIMOR LESTE	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: USA	**class: (from applying PC3)**	**comments:**
		No class assigned - all sites had less than 3 populations
site name: VIETNAM	**class: (from applying PC3)**	**comments:**
Xuan Thuy Ramsar Site	Class 1	

Appendix 8. Coordinates of sites listed in Tables 6 and/or 7 (the top ranked, undesignated candidate sites for the FSN)

			coordinates, decimal degrees	
country	**site name**	**sub-national division**	**latitude**	**longitude**
Australia	SE Gulf of Carpentaria	Queensland	-17.4700	140.7600
Bangladesh	Pashua Haor	Sylhet	25.0333	91.0833
Bangladesh	Maulavir Char	Ganges Delta	22.3833	91.0167
Brunei	Wasan Rice Scheme		4.7500	114.8333
Cambodia	Prek Toal	Battambang	13.1333	103.6333
Cambodia	Ang Trapeang Thmor	Bantey Meanchey	13.7833	103.3000
China	East Dongting Lake NR	Hunan	29.2500	112.9167
China	North Bo Hai Wan	Hebei	39.0833	118.4333
China	Dongsha Islands	Jiangsu	33.1167	121.3500
China	Shi Jiu Tuo/Daqing He	Hebei	39.1333	118.8167
Indonesia	Pantai Sejara (Asahan regency)	North Sumatra	3.0167	99.8667
Indonesia	Bagan Percut	North Sumatra	3.7167	98.7833
Japan	Lake Izunuma, Lake Uchinuma	Miyagi	38.7167	141.1167
Japan	Notsuke Bay	Hokkaido	43.5833	145.3000
Japan	Isahaya Higata (Isahaya Bay)	Kyushu	32.8333	130.0833
Malaysia	Pulau Tengah (Klang Islands)	Selangor	2.9669	101.3080
Mongolia	Buir Nuur complex	Dornod	47.7589	117.7714
Mongolia	Uldze (Ulz) River Basin	Khentii-Dornod	49.2000	113.6167
Myanmar	Gulf of Martaban	Yangon-Bago-Mon	16.7867	96.8526
New Zealand	Manukau Harbour	North Island	-36.9667	174.8333
New Zealand	Kaipara Harbour	North Island	-36.4167	174.2500
New Zealand	Parengarenga Harbour	North Island	-34.5160	172.9575
North Korea	Anpyong Plain	Kangwon	38.9500	127.5167
P. New Guinea	Kikori Delta	Gulf Province	-7.6500	144.5000
Philippines	Manila Bay	Luzon	14.5000	120.7500
Russia	Kolyma Lowlands	Sakha (Yakutia)	70.0000	157.0000
Russia	Kharchinskoe Lake	Kamchatka	56.5333	160.8667
Russia	Zeya - Bureya Lowland	Amur	50.5000	128.5000
South Korea	Ganghwa Island (tidal flats)	Incheon	37.5833	126.5000
South Korea	Yeongjong (Yong Jong) Island	Incheon	37.5167	126.5333
Thailand	Inner Gulf of Thailand	4 provinces	13.5058	100.5270
Timor Leste	Timor		-10.0000	120.5000
USA	Alaska Peninsula		56.0000	-161.0000
Vietnam	Tram Chim National Park	Dong Thap	9.6667	105.6667
Vietnam	Xuan Thuy Ramsar Site	Nam Dinh	20.3500	106.5167