

Scientific Seminar on Avian Influenza, the Environment and Migratory Birds

UNEP HQ, Gigiri, Nairobi, Kenya
10-11 April 2006

Conclusions and Recommendations

Short Version

MEETING GOAL

To address migratory bird populations and environmental aspects in the current Asian lineage Highly Pathogenic Avian Influenza (HPAI) virus subtype H5N1 epidemic.

BACKGROUND

Sound scientific information, including an understanding of the environment and migratory bird populations, is a necessity for understanding the HPAI H5N1 epidemic.

HPAI H5N1 is an avian virus. Humans and other mammals are currently aberrant hosts.

RECENT ADVANCES

H5N1 is considered to have been spread between countries by a number of different known vectors, including the movement of live poultry and its by-products, legal and illegal trade in birds, equipment associated with these respective industries, movement of people, and migrating waterbirds.

The current situation is unique in that the ecology and epidemiology of Asian lineage HPAI H5N1 differs from that observed for previous Avian Influenza Viruses (AIVs). In the present epidemic disease occurs in a wide range of species that include poultry, wild birds, humans and other mammals.

RECOMMENDATIONS

Surveillance and Early Warning System

Early detection is essential for the control or eradication of Asian lineage HPAI H5N1.

FAO, OIE, and WHO – Global Livestock Early Warning and Response System (GLEWS). It has the potential to be enhanced (and must be) to also track the spread of HPAI H5N1 in populations of wild birds. The integration of The Global Avian Influenza Network for Surveillance (GAINS) into this EWS is encouraged.

This system must be rapid, transparent, and have local, national and international levels.

Risk Assessment

All countries should undertake risk assessments which should be transparent, structured, science-based and make use of all available knowledge.

Research Needs

We need to increase research on various aspects of the epidemiology and ecology of H5N1 in wild bird populations and the environment. These include:

- 1. Prevalence of H5N1 in various wild bird populations.*
- 2. Analysis of existing ringing and monitoring data and implementation of targeted work to increase understanding of migratory systems.*
- 3. Ecology of virus in the environment.*
- 4. Natural mortality rates in wild bird populations.*
- 5. Wild bird susceptibility to H5N1 among high risk species.*
- 6. Effective measures to reduce spread of H5N1 between wild birds and poultry.*

Other Short and long Term Needs

We must collate data available on trade issues to fully understand the epidemiology of the disease.

The development of compensation policies for agricultural losses and for impacts on protected areas must be proactively established.

We need to effectively communicate with the media, and ultimately educate the public and policy makers using facts.

Interplay between the agriculture, animal (domestic and wildlife) health, human health, ecosystem health, and socio-cultural factors should be emphasized.

Maintaining and developing collaborative approaches to address the multiple and complex issues raised by the international spread of HPAI H5N1 will prove to be critical to long-term success.

Resources are required to strengthen and broaden the Scientific Task Force on Avian Influenza and Wild Birds to carry forward these recommendations.

Extended version

INTRODUCTION

In mid-2005, concerns about the role of migratory birds as potential vectors of the Asian lineage Highly Pathogenic Avian Influenza (HPAI) virus subtype H5N1, which was spreading north-westwards from its origins in East and South-east Asia, led the UNEP Convention on Migratory Species (CMS) to establish a Scientific Task Force on Avian Influenza and Wild Birds. The Scientific Task Force on Avian Influenza, which was established in August 2005, now comprises 13 members and observers, including UN bodies, wildlife treaties and

specialist non-governmental organisations and institutions. The Task Force aims to obtain the best scientific advice on the conservation impact of the spread of HPAI H5N1, assessing the role of migratory birds as vectors of the virus, and issuing advice on the root causes of the epidemic as well as technically sound measures to combat it and develop early warning expertise.

Largely as a result of the Task Force's work, successive Conferences of the Parties (COPs) to the African-Eurasian Waterbird Agreement, the Ramsar Convention on wetlands and CMS, held between October-November 2005, passed detailed Resolutions on avian influenza. More recently the Convention on Biological Diversity held a brainstorming meeting on the impacts of avian influenza on wildlife in Brazil in March 2006 prior to its eighth Conference of the Parties, which subsequently adopted a decision on the subject.

The Seminar on Avian Influenza, Wild Birds and the Environment has been convened by CMS, AEWA and UNEP in April 2006 in Nairobi, Kenya, with the main purpose of identifying follow up actions and make recommendations for the practical implementation of the provisions of the above-mentioned Resolutions. It has also reviewed the latest scientific studies concerning the evolution and spread of Asian lineage HPAI H5N1, its impacts on wild birds and the wider environment. The seminar discussed issues related to the risk of further transmission and to effective risk mitigation strategies.

The Seminar recalled the conclusions of the Contracting Parties to the African-Eurasian Waterbird Agreement (AEWA)¹, the Ramsar Convention on wetlands², and the Convention on Migratory Species (CMS)³ that Highly Pathogenic Avian Influenza (HPAI) H5N1 is considered to have been spread between countries by a number of different known vectors, including the movement of live poultry and its by-products, legal and illegal trade in wild or captive birds, movement of people, and migrating waterbirds. The relative significance of these different modes of spread has varied and evidence of causal links is weak or lacking in many cases.

The Seminar considered that this statement still accurately reflects the current situation, noting also that recent events have highlighted situations where more than one vector can combine to spread HPAI.

The current situation is unique in that the ecology and epidemiology of Asian lineage HPAI H5N1 differs from that observed for previous Avian Influenza Viruses (AIVs) and has now caused disease in a wide range of species, not only of birds but also of mammals.

Recent events have highlighted the significant impacts the spread of this virus has had on livelihoods of rural populations, with negative consequences both for food security and economies especially in developing countries.

Overall the establishment and maintenance of high standards of poultry biosecurity remains central to the reduction of risk of infection of poultry by HPAI H5N1. It is important that national veterinary services are upgraded to OIE standards.

SURVEILLANCE, EARLY WARNING AND RISK ASSESSMENTS

¹ AEWA MoP3: Resolution 3.18. Avian Influenza. Dakar, Senegal. http://www.unep-awea.org/meetings/en/mop/mop3_docs/final_resolutions_pdf/res3_18_avian_influenza.pdf

² Ramsar CoP9: Resolution IX.23. Highly pathogenic avian influenza and its consequences for wetland and waterbird conservation and wise use. Kampala, Uganda. http://www.ramsar.org/res/key_res_ix_23_e.pdf

³ CMS CoP8: Resolution 8.27. Migratory species and highly pathogenic avian influenza. Nairobi, Kenya. http://www.cms.int/bodies/COP/cop8/documents/proceedings/pdf/eng/CP8Res_8_27_Avian_Influenza_eng.pdf

Early detection is essential for the control or eradication of Asian lineage HPAI H5N1.

In response to the spread of HPAI H5N1, the responses of the Food and Agriculture Organisation (FAO), the World Organisation for Animal Health (OIE) and the World Health Organisation (WHO), have been considerable, notably through the publication in May 2005 of a *Global Strategy for the Progressive Control of Highly Pathogenic Avian Influenza*, and its implementation, *inter alia*, through regional programmes of *Emergency Assistance for Early Detection and Prevention of Avian Influenza*. FAO, OIE and WHO have developed an integrated early warning system (Global Livestock Early Warning and Response System to Major Transboundary Diseases - GLEWS) which includes already available information from both official and unofficial sources. It has the potential to be enhanced more comprehensively to track the spread of HPAI H5N1 in populations of wild birds. It is clearly crucial to build on existing activities to more fully consider disease surveillance in wild bird populations, since adequate surveillance for HPAI H5N1 in populations of both wild bird and poultry, and the rapid reporting of infection, remains central to international and national control strategies.

Surveillance programmes, operating at various scales, should be developed as a matter of priority through building upon and enhancing existing activities. They should always have clearly defined objectives and their development should incorporate the results of risk assessments that have established likely species at higher risk of carrying HPAI H5N1, as well as the best strategic design (optimal selection of sampling sites) and methods of sampling these species. If infection rates in wild bird populations are low, then surveillance will need to be carefully targeted with adequate sample sizes (and locations) so as to ensure adequate detection sensitivity. National programmes of surveillance should be planned jointly by ornithologists working together with veterinary experts.

Given that national results are of high relevance in the wider international context it is important that reporting of results is rapid, very much more rapid than at present - with rapid sharing of data between countries and collaborating organisations.

The development of global early warning systems (EWS), which incorporate the results of national and international surveillance programmes should have the following attributes:

- be web-based so as to allow the rapid dissemination of open-access data and information deriving from surveillance systems;
- should allow for integration of surveillance results with geographical and other data sets so as to facilitate integrated responses and risk management;
- should fully report associated meta-data that would allow full analysis and interpretation of results in order to decide on accurate response (*inter alia*, information on type of surveillance (active or passive) and locations of sampling locations); and
- facilitate the timely and effective management of risks identified as a result of early warning. This implies clear warning triggers and targeted reporting.

The development of the Global Avian Influenza Network for Surveillance (GAINS) as an international initiative (and NEWFLUBIRD in western Eurasia and Africa as a possible regional component of GAINS) clearly would fully incorporate these requirements and their development should be encouraged.

There is a need for developing and implementing more comprehensive and integrated surveillance and early warning systems for avian influenza. Current EWS address specific aspects of AI be that the epidemiological, human, wildlife or ecological aspects of the disease. More comprehensive EWS would also serve as a reliable base for risk assessments. In this regard, it was noted that the mandate of UNEP's Division for Early

Warning and Assessment suggests that it might productively contribute to the development and implementation of comprehensive early warning systems, in particular for the incorporation of environmental data and information, linking environmental aspects to risk assessments, and promoting institutional and technical related capacity building for monitoring and early warning-particularly in developing countries.

Support for the implementation of effective EWS is even more necessary in developing countries given the lack of resources, both human and financial, that might be available for such purpose.

In addition to the international level reporting of HPAI (*i.e.* of notifiable diseases to OIE), there is an imperative to ensure that both active and passive surveillance and reporting, at the local level is standardised, efficient, transparent and appropriate to the local needs. The National and Regional hubs to co-ordinate this need should be identified *e.g.* African and European Unions and Regional Economic Groupings - *e.g.* COMESA in Africa and ASEAN in Southeast Asia.

There are surveillance systems that have been developed to rapidly gather disease information and ensure rapid response. An example is ARIS (Animal Resources Information System) in Africa - a flexible country surveillance reporting system through African Union-Inter-African Bureau of Animal Resources, which provides capacity for automatic reporting to OIE to avoid duplication of effort.

Participatory international initiatives should ensure coordination with regional and national existing monitoring and early warning processes and systems to increase the reliability of warnings and follow-up response actions.

We envisage that the proposed integrated and comprehensive surveillance and early warning systems should have a scientific base to avoid the use of *ad hoc* or anecdotal reporting systems which cannot be objectively assessed or interpreted.

Risk assessments

All countries should undertake risk assessments which should be transparent, structured, science-based and make use of all available knowledge. The communication of web-links to national or other assessments via a single clearing house mechanism would be helpful.

There is a general need to strengthening HPAI field surveillance in wild birds and especially in developing countries. To this end the further building of national capacity to develop and implement field programmes for AIV surveillance would be assisted through the development of training courses and relevant capacity building, especially involving international collaborations with existing centres of expertise. The programme of Technical Co-operation Programmes on avian influenza and wild bird surveillance in Africa, Middle East and Central Europe initiated by FAO has been an extremely helpful response, and the Seminar encourages FAO to further develop and co-ordinate wildlife surveillance activities for AI and funding of this crucial activity, including expanding capacity development into Asia.

Similarly, there is an important need to develop the capacity of veterinary services world wide to aid field responses to outbreaks. The need to enhance the capacity of human health services, especially in developing countries, in anticipation of an avian influenza pandemic was noted, whilst recalling that human health aspects lie outside the mandate of the Scientific Task Force on Avian Influenza and Wild Birds.

Maximum information should be routinely gathered from each outbreak of HPAI H5N1 in both wild and domestic birds on the ecological and epidemiological aspects so as to enhance epidemiological understanding. This would be facilitated by including ecological expertise in the early response missions so as to collect a broad range of contextual information such as species present. To this end, there is an immediate need for surveillance for AIVs in the vicinity of past and current HPAI outbreaks so as to establish actual infection levels in wild birds using these areas. This will build understanding of the ecology of the virus.

Data and information needs

Best practice guidance on the practicalities of how to plan and undertake AIV field surveillance is urgently needed, and should be translated and widely disseminated.

Better, contemporary and international analysis of existing waterbird ringing and count data is needed so as to synthesis summary information on the routes and timing of waterbird migration systems, especially of poorly known intra-African migrants, Asia-Pacific and Neotropical flyways. The results of these studies and other relevant data should be made more readily available through the production of flyway atlases, ideally published on the internet so as to enhance the accessibility of this information.

Targeted international ringing, colour-ringing and satellite telemetry programmes for selection of waterbird species likely to be at higher risk of carrying HPAI H5N1 so as to improve the scope of relevant dataset would be valuable.

Regional waterbird conservation initiatives have the potential to valuably stimulate better co-ordinated studies of migratory waterbirds in flyways and regions where information on bird movements is relatively poor. For example, activities of the Asia-Pacific Migratory Waterbird Conservation Strategy in establishing a specific Working Group on Migratory Waterbirds and AI have potential to further develop the collection of data and information from Asian-Pacific flyways.

The international collation of waterbird count data by the International Waterbird Census in seasons other than January would valuably enhance international capacity to analyse waterbird movements and flyway systems and allow for gathering or mortality information at additional periods of the year.

The collection and reporting of information on, and samples from, birds (both wild and domestic) should always be referable to at least species level. Latin names derived from a defined taxonomic reference should always be used in the reporting of data. For waterbirds, taxonomy and population identification should follow Wetlands International's *Waterbird Population Estimates*. Photographs should routinely be taken which can then subsequently identified or reconfirmed by specialists. Teams capturing wild birds for AIV sampling should include both veterinarians and ornithologists capable of identifying the species caught.

As an important component of the development of risk assessments there is a need for better consolidated information on national and international trade in poultry and poultry products. Efforts should be made to obtain accurate data on the volume of such trade from the poultry industry. Similarly information on the volume of international trade in wild birds should be sought from the Convention on International Trade in Endangered Species (CITES), TRAFFIC, and other relevant sources of data and information.

Research requirements

The establishment of national programmes to establish baselines and monitor trends in natural mortality levels in waterbirds would better allow the identification of unusually high mortality.

The establishment of long-term surveillance programmes for AIVs at strategically important 'mixing' (and/or staging areas) on flyways is a strategic priority.

PRIORITY SHORT TERM NEEDS

The effective containment of HPAI H5N1 outbreaks depends critically on rapid reporting and control measures. Experience has shown that reporting can be significantly encouraged through the establishment of compensation mechanisms to defray the extent of economic losses resulting from control programmes, especially in developing countries. However, although desirable, payment of compensation can raise complex issues. Seminar participants recognised and acknowledged the importance of this issue and further encouraged the activities of FAO to facilitate the development of national compensation policies, where their application may be useful and appropriate.

Wetland protected areas play a vital role in bird and biodiversity conservation, as well as public education and environmental communication. When these areas depend on visitor revenue, their long-term future can be severely compromised by either unnecessary closure as a result of H5N1 concerns, or reduced visitor numbers due to public misconceptions.

The Seminar urged governments to:

- avoid prescribing closure of wetland protected area except where absolutely necessitated by a continuing H5N1 outbreak. Wholesale reserve closure serves very limited disease control and is highly detrimental to conservation;
- communicate to the public that it continues to be entirely safe to visit wetland protected areas, in the absence of an H5N1 outbreak at the site; and
- work with site management and veterinary authorities to ensure regular and effective site monitoring, to ensure rapid detection of any potential H5N1 outbreak.

Data and information needs

There is need for international synthesis of information concerning migration phenology for example which species arrive in which country in which month? Whilst there is much (scattered) national information this has never been collated internationally other than for a few species. This has policy relevance in terms of identifying high risk periods.

Research requirements

There is an urgent need for research on the behaviour and ecology of migratory and non-migratory species living in close association with man and which might thus provide a 'bridge' for the transmission of HPAI from waterbirds to poultry. Such research should aim to developing practical guidance on ways and means of reducing this risk.

Field studies are needed to clarify exposure pathways to develop practical guidance on effective means of reducing transmission between wild waterbirds and domestic poultry and

thus enhancing biosecurity - especially suitable for use in developing countries (for example in village poultry situations).

Communication, education and awareness of public and policy-makers

In 2005, Contracting Parties to the African-Eurasian Waterbird Agreement, the Ramsar Convention on wetlands, and the Convention on Migratory Species noted that there was no justification for killing birds as a supposed control measure for HPAI and strongly supported *"the recommendations of WHO, FAO and OIE that attempts to eliminate HPAI in wild bird populations through lethal responses such as culling is not feasible and should not be attempted, not least since it may exacerbate the problem by causing further dispersion of infected birds."*

Further, Contracting Parties to the Ramsar Convention emphasised *"that destruction or substantive modification of wetland habitats with the objective of reducing contact between domesticated and wild birds does not amount to wise use as urged by Article 3.1 of the Convention, and also may exacerbate the problem by causing further dispersion of infected birds."*

The Seminar was especially concerned to hear that some countries have adopted policies to control wild birds, and noted that there is not a single example of a disease of both livestock and wildlife being controlled successfully by the killing of wildlife in an attempt to eradicate disease reservoirs. **Organisations represented on the Scientific Task Force on Avian Influenza and Wild Birds are asked, as a matter of urgency, to work with the countries concerned to develop awareness that policies of wild bird control or wetland habitat destruction are likely to be ineffective and may exacerbate the situation by spreading HPAI H5N1.**

The spread of HPAI H5N1 is of public concern, yet there remains widespread public misunderstanding of the issue in many countries, including circulation of misinformation. This creates political pressure for ill-advised and disproportionate policies such as the culling of wild birds and the destruction of wetland habitats. Conservation organisations scientists and veterinary services should actively work with media to enhance the accuracy of reporting on this issue. This should include the development of much more effective communication strategies to give policy makers, stakeholders and the general public more balanced information on real levels of risk and appropriate responses.

The current situation gives an important opportunity to communicate important messages regarding sustainable development, especially with respect to the interface of agriculture, human health, wildlife health, ecosystem health and sociology.

As a matter of urgency, it would be valuable to collate best advice and develop guidelines on potential responses to be undertaken in the event of HPAI H5N1 detection in wild birds for use by land managers and veterinary services. This might usefully be disseminated via a web-based clearing house mechanism.

LONGER TERM NEEDS

It is a priority to build programmes of sustainable financial and other support for the range of short-term programmes that have or will be developed in response to the spread of HPAI H5N1.

The degradation of the health of ecosystems as documented by the Millennium Ecosystem Assessment and a review presented to the Seminar, and especially in the decline in extent and condition of wetlands, has had a role in the evolution and spread of HPAI H5N1. It has created the conditions where there is closer contact and mixing between people, domestic poultry (including ducks), and wild waterbirds. This encourages cross-infection with the potential of causing genetic changes which may result in higher viral pathogenicity. Reducing the opportunities for such contacts through preventing further loss of wetlands, improving mechanisms for the maintenance and wise use of wetlands is an important long-term requirement. To this end it would be valuable to develop and disseminate practical guidance, *inter alia* in collaboration with the Ramsar Convention. It would also be desirable in collaboration with FAO to develop and disseminate practical guidance in restructuring agricultural production systems with the goal of reducing stress on the environment and risks to human health. Agro-ecosystem health is viewed as a key to sustainable human health and well-being.

Data and information needs

Better information is needed on those cultural practices that have the potential to either help or hinder the control of HPAI H5N1 and the potential to modify inherently risky behaviour by humans.

COLLABORATION AND CO-OPERATION

Maintaining and developing collaborative approaches to addressing the multiple and complex issues raised by the international spread of HPAI H5N1 will prove to be critical to long-term success. To affect successful solutions, collaborative partnerships will need to be fully integrated involving the range of necessary ornithological, wildlife, and wetland management expertise together with those traditionally responsible for public health and zoonoses, including veterinary, agricultural, virological, epidemiological, and medical expertise. Partnerships are needed at multiple scales, including international, national and local (the latter especially in the context of responses to HPAI H5N1 outbreaks).

The continued close working and collaboration of the organisations and international agencies represented on the Scientific Task Force on Avian Influenza remains essential.

Data and information needs

There is a need for better integration of existing data on trade in poultry and other birds in the context of epidemiological modelling at various scales.

The establishment of a web-based clearing-house mechanism which would provide a single source of information on the spread of HPAI H5N1, including surveillance results, is urgently needed.

NEXT STEPS

The Seminar asked the Scientific Task Force on Avian Influenza, as a matter of urgency, to promote the implementation of these conclusions and recommendations both within participating organisations and agencies, and with others as necessary and appropriate.

The seminar asked CMS to review the Terms of Reference, membership and name of the Scientific Task Force on Avian Influenza and consider future priorities for the activity of this liaison group. The review should consider also potential co-operation with other organisations that might support the activities of the Task Force.

In order to maintain a professional approach by the Scientific Task Force, additional resources are urgently needed. As a minimum, the Task Force should aim to appoint a full-time Task Force co-ordinator for an initial period of 12 months. Task Force members and observers, other Seminar participants and Governments are invited to provide funding or in-kind support for this, and, if possible, further resources in support of Task Force activities beyond the minimum level.

A review of the work of the Scientific Task Force on Avian Influenza, including a summary of these conclusions and recommendations should be transmitted to the UN Special Co-ordinator for Avian Influenza.

11 April 2006

Avian Influenza and Wildlife Workshop 'Practical Lessons Learned'

Aviemore, Scotland, UK
26-28 June 2007

1. Introduction

An international workshop was convened by the Scientific Task Force on Avian Influenza and Wild Birds, and organised by the Convention on Migratory Species (CMS) and Scottish Natural Heritage. The Task Force was established in 2005 to create a liaison mechanism between those international organisations and intergovernmental environmental agreements engaged in activities related to the spread of H5N1 Highly Pathogenic Avian Influenza (HPAI) of Asian lineage. It comprises representatives and observers from 14 international organisations, including four UN bodies.

The Task Force was set up out of a need for information on wild birds to be better reflected in the debate about H5N1 HPAI and its spread around the world. It has had eight teleconferences and works also by e-mail and meetings. The activity of the multi-agency Task Force has been crucial to help develop collaborations and joint work programmes, and has thus enhanced the effectiveness of responses.

The objective of the Aviemore workshop in June 2006 was specifically to review practical issues arising, and lessons learnt, from recent outbreaks. The Aviemore workshop identified a number of important conclusions and recommendations for future action. It also brought together a summary of available guidance on a range of relevant topics (Annex 1). It reviewed also progress since the first meeting of the Task Force in Nairobi in April 2005 as detailed in Annex 2.

A central theme running through most of these conclusions and recommendations is the continuing need to further develop national capacities within government and elsewhere to respond to the challenges posed by H5N1 HPAI — not only in responding to outbreaks, but also preparing for these through contingency planning and risk assessment. Central to this activity is the close and integrated working of both governmental and non-governmental sectors — specifically the bringing together of the complementary expertise of epidemiologists, veterinarians, virologists, biologists and ornithologists.

Whilst much attention has been focussed on H5N1 HPAI, other H5 and H7 HPAI subtypes also pose major risks for the poultry industry. Indeed, developing wildlife surveillance programmes and enhancing biosecurity raise issues common to responses to other zoonoses. The workshop stressed the need to take longer-term and integrated perspectives in responding to the challenges posed by these diseases.

2. Contingency planning, risk assessment and response strategies

Conclusions

- The UN Food and Agriculture Organisation's (FAO) [*Manual on the preparation of national animal disease emergency preparedness plans*](#) recommends the development of four sets of complementary technical contingency plans:
 1. specific disease contingency plans that document the strategies to be followed in order to detect, contain and eliminate the disease;
 2. standard operating procedures that may be common to several or all emergency disease campaigns;

3. enterprise manuals that set out zoosanitary guidelines for enterprises that may be involved in an emergency animal disease outbreak; and
 4. simple job description cards for all individual officers.
- It remains a pressing issue to build the capacity and develop appropriate organisational structures for veterinary services in developing countries so as to be able effectively to respond to outbreaks of H5N1 HPAI outbreaks, particularly in domestic poultry. Indeed, there has been considerable past investment in trying to develop national veterinary capacity. Recognising the central importance of this need, the meeting identified however that governance issues historically had meant that such investments had not always delivered anticipated benefits. Good governance and the elimination of corruption are crucial to maximise return on investments in capacity development, and thus allow the delivery of more effective responses. It is crucial that the further development of veterinary capacity should be undertaken against specifically defined objectives and should result in change.
 - In developing national contingency planning, it is essential that countries put in place effective and flexible mechanisms for inter-agency co-ordination and action backed at the highest possible political/Ministerial level. This should especially co-ordinate between the various government ministries and departments likely to be involved (typically of Agriculture and Environment).
 - Countries should be encouraged to name a central Avian Influenza focal point for liaison with the Task Force, so that when outbreaks occur, the Task Force can then disseminate relevant information to the focal point (and *vice versa*).

Poultry holdings

- Integrated analyses that relate distribution and numbers of poultry to that of waterbirds have considerable potential to maximise the likelihood of identifying higher risk areas where surveillance of wild birds can then be focussed. A good example of such an integrated study was presented from the [UK](#), and this approach has also been undertaken in some other European countries. In doing this, dialogue with the poultry industry is important to understand and fully reflect the appropriate risk factors for poultry holdings. FAO's Technical Co-operation Programmes have undertaken similar attempts for Africa and Latin America but data limitations related to wild birds still give challenges.
- Ornithologists and ecologists should always be involved in outbreak response teams, as well as with surveillance programmes. Experience has repeatedly demonstrated that their technical expertise can provide valuable insights into possible epidemiological lines of investigation. The Task Force should strategically address how best to convince veterinary authorities of this need and the resulting benefit to them.
- Where stamping out occurs, particular care needs to be taken in the biosecure disposal of infected carcasses (and other sources of virus contaminated fomites), so as to avoid the risk of the infection of scavenging birds or mammals.
- The potential spread of infection by professionals and others risk (*e.g.* vaccination or veterinary investigation teams) moving between infected and uninfected holdings is also a major risk.
- Practical experience in Africa has shown that early reporting of outbreaks will be encouraged by rapid payment of compensation, which should be uniform across a country or region to avoid encouraging the movement of (infected) poultry to areas which have higher rates of compensation. An adequate level of financial compensation is important if early reporting of infection is to be encouraged, and these rates should be regularly reviewed against market prices.
- Sustained public sensitisation and awareness programmes are essential to any control and containment programme.

- The experience of some Asian countries, where H5N1 HPAI is now endemic, suggests that it is unlikely that this virus will be readily eliminated in the poultry sector unless concerted action is taken at many levels. As documented elsewhere, a range of responses are available to reduce levels of infection: “In tackling this disease, countries should adopt integrated control programs using the combination of measures best suited to the local environment⁴.”

Nature reserves and wild birds

- The workshop learnt with great concern of continued misplaced responses in some countries, including the active killing of wild birds in response to infection within a country. To further highlight the inappropriateness of such practices, in many cases extensive killing has occurred in places remote from any poultry potentially at risk.
- There would be benefit in developing and disseminating international good practice guidance related to risk assessment and outbreak response planning at nature reserves and other protected areas, especially for sites of conservation importance for birds. These assessments are best undertaken in the context of site management plans, aiming to identify and manage risks towards key conservation values (*e.g.* threatened species) at such sites. Ideally, risk assessment and management measures should be linked to the wide range of existing relevant guidance developed by the Ramsar Convention on wetlands. In particular, stakeholder communication and participation is critical.
- There is limited FAO guidance related to the dealing with outbreaks or identification of isolated cases of H5N1 HPAI infection in wild birds. It is recommended that guidance on this complementary to that already existing be issued urgently.
- The unnecessary closure of nature reserves and other protected areas when no outbreaks have occurred at the site should always be avoided. This is in accordance with much of the scientific data available on the low frequency of the H5N1 HPAI occurrence within wild bird populations, and the lack of evidence that wild birds play a significant rôle in the spread and transmission of infection of H5N1 to humans.

Zoos and animal collections

- Highly pathogenic avian influenza poses a particular risk to zoological collections in terms of: staff and visitors health and safety issues; threats to susceptible captive animals of conservation importance; the animal welfare implications of both the disease and disease control actions; and in terms of financial impact (expenditure for contingency planning and potential reduction of income from, for example, reduced visitation). There have been cases of H5N1 HPAI infection reported from within zoos in at least seven countries⁵ since 2003. In some cases, infected poultry products fed to carnivores were the most likely source of infection, but the source of most introductions remains unknown.
- Potential impacts can be minimised by rigorous risk assessments and thorough contingency planning. It is essential that zoos and collections develop detailed contingency plans using a dedicated multidisciplinary team. Such plans should address the multiple sources of risk faced, as well as planning necessary responses. These include:
 - Staff and visitor health and safety based on minimising contact between humans and birds or their products, and/or improving hygiene measures.
 - Protection of captive stock by means of enhanced biosecurity and possible vaccination although the latter option raises a number of issues that need careful consideration.
 - Communication strategies for staff, visitors, external stakeholders and the media.
 - Operational aspects *e.g.* guides, educational staff, shops, restaurants, sales, *etc.*
 - Access to site *e.g.* staff living on site, contractors, other site-users, *etc.*
 - Closure of zoo if necessary plus a strategy for re-opening.
 - Business aspects to redress financial impact.

⁴ Sims, L.D. 2007. Lessons learned from Asian H5N1 outbreak control. *Avian Diseases* 50: 174-181.

⁵ Thailand, Viet Nam, Indonesia, Pakistan, Kuwait, Ukraine and Germany.

Plans need continued review and updating particularly in light of new information regarding epidemiology, changing legislation and to reflect internal organisational changes.

- Scenario setting, staff training and formal exercises involving relevant statutory and other organisations or veterinary authorities that are engaged with private or public collections are absolutely essential to developing preparedness plans. Such exercises should include follow-up activities with those involved to develop lessons-learned and the corrective measures to be taken (including mechanisms to ensure compliance).
- It is particularly important to establish good communication networks *before* infection crises occur, such that there is clear understanding of the issues related to a specific zoo or animal collection by all those potentially involved in responses.
- A fundamental aspect of good biosecurity in zoos and collections is a ban on the feeding of actually, or potentially, diseased/infected poultry to carnivores.

Key recommendations for future action

1. The workshop condemned the continued misplaced practice of actively killing wild birds or destroying their nest sites and wetland habitats in response to disease detection or perception. This is contrary to the recommendations of the UN Food and Agriculture Organisation (FAO), the World Organisation for Animal Health (OIE), World Health Organisation (WHO) and also of the Contracting Parties to intergovernmental treaties such as the Ramsar Convention on wetlands, the Convention on Migratory Species (CMS) and the African-Eurasian Waterbird Agreement (AEWA). Such approaches to the prevention or control of HPAI are wasteful, damaging to conservation and have no scientific basis. They may also exacerbate the problem by causing further dispersion of infected birds. It highlights the need for policy and management decisions to be based on evidence.
2. There is an important and urgent need to develop national preparedness plans through drafting broad-ranging contingency measures. These should involve not only statutory and other regulatory authorities but also those of the non-governmental sector. Scenario-setting and training exercises are critical to enhance understanding of issues and the responses that will be necessary in the event of disease or infection detection in the country.
3. National contingency planning and preparedness require strong inter-agency/ministry collaboration as well as political support within governments from the highest levels possible. The inter-disciplinary joint collaboration of different ministries (to include at a minimum, Agriculture, Environment, Forestry, and Health), and organisations directly results in greater capacity and complementary expertise. Specifically, those ministries and agencies with authority and expertise with wild bird science and management need to be included in contingency planning.
4. Guidance on best practice contingency planning should be further developed by relevant international organisations including FAO and OIE. The collation and publication of 'best practice' case studies would be valuable.
5. There continues to be a need to learn from each case of infection by H5N1 HPAI. This would greatly assist with developing better understanding of the epidemiology of H5N1 HPAI. It is important that there should be routine inclusion of ornithological experts in field outbreak investigation or response teams, including at poultry farms. The development of national and international registers of experts able to assist in such missions would be valuable. There is a need to add from a wildlife perspective, protocols that supplement current outbreak investigations at poultry farms, in order to evaluate the role that wild birds may play in disease introduction there, or the potential for disease to be spread from farms into wild bird populations.
6. There is a need to develop international best practice guidance related to responses to cases or outbreaks of infection in wild birds with specific considerations for those events occurring in protected areas or nature reserves. This includes guidance on measures to reduce risks at

sites of conservation importance for susceptible birds. The Task Force should help stimulate such guidance.

7. A 'lessons learnt' review should always be undertaken following the application of an HPAI contingency plan and/or outbreak of infection, and any conclusions concerning how better to improve responses or preparedness subsequently implemented.
8. There is a need to integrate responses and strategies for avian influenza and similar zoonoses into Agreements and Action Plans developed under the Convention on Migratory Species, such as *inter alia*, the African-Eurasian Waterbird Agreement and the Siberian Crane Memorandum of Understanding.

3. Surveillance and early warning systems

Conclusions

- The development of practical programmes of training and capacity development by FAO, Wetlands International, the UK Wildfowl & Wetlands Trust (WWT), the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and others has been a very welcome step forward. Such programmes need to be sustained and further developed, recognising that single training courses by themselves are insufficient to develop significant long-term capacity. Follow-up is essential.
- The development of FAO guidance on the development of surveillance programmes is welcome but needs to be further developed based on lessons learnt from practical experience.
- Whilst differing national circumstances and capacity will dictate the exact arrangements for national surveillance programmes, the experience of some countries demonstrates significant benefits if surveillance is systematically organised through a single organisation. This can lead to high efficiency in organisation and quality assurance, facilitates logistic support and effective supply chains, and allows for rapid communication with all those involved.
- The issue of species identification of birds affected by AI remains problematic, with significant numbers of apparently misidentified species being reported. This remains also a problem with the quality of formal national reporting to, and international reporting by, OIE — possibly caused by the fact that higher quality information is provided in free text fields, which are not included in the standard OIE reports. Rather, in these reports the strongly categorized standard 'questionnaire' is used as the main source and this system is not the most useful one in gathering precise information on species identify.
- Inclusion of photographs are essential to assist confirmation of cage-birds which are usually non-native to the country concerned. It is important that birds either captured for active AI surveillance, or reported by the public in the context of AI, are identified by trained ornithologists. In the event of doubts as to identity, digital photographs should be taken and these stored with reference to the sample until virological testing is completed. (If such information was not collected at the time of capture, this allows additional information such as age and sex of birds to be assessed). Where trained ornithologists are not present (for example dead birds sent direct to laboratories for testing), photographs should **always** be taken to allow identification by knowledgeable personnel. The European Commission has published technical guidance as to how best to take such photos (Annex 3B). There would be benefits in this guidance being translated and more widely promulgated as an international best practice.
- To begin to develop a better understanding of what comprises 'unusual mortality' — often used as a trigger for the collection and sampling of carcasses — it would be valuable for surveys of waterbirds to start to collect data on the numbers of dead birds found during routine surveys to obtain baseline values in a given ecosystem during a given time of the year.

- In some countries the public have been involved in the reporting of dead birds. Experience has demonstrated benefit in developing clear guidance to help agencies to respond to such reports: having a clear, rule-based system helps reduce public misunderstandings.

Key recommendations for future action

1. Poor identification and reporting to the OIE remains a major concern. Analysis of recent reports to OIE where wildlife are part of the outbreak or die-off records, often lack species identification using binomial standard nomenclature, information on the precise location and timing of infection, as well as the means by which cases are detected. These deficiencies constrain improved analysis in understanding of the H5N1 HPAI epidemiology. Task Force members should draft a letter to the OIE Scientific or Standards Committee for submission by the Task Force Chair to request the OIE in enhancing member country's reporting in these respects and so improve the quality of data registered and disseminated. Photographic documentation of affected species should be strongly promoted. The European Commission has developed valuable standards related to the photography of wild birds as an aid to identification. These should be considered for inclusion in relevant FAO and OIE best-practice manuals and other international guidelines. Furthermore, exact reporting of outbreak locations rather than the location of the reporting institute or ministry should be strongly promoted.
2. Openly accessible data and information on the location and extent of avian influenza surveillance, and results in wild birds is important to help build international understanding of the ecology of this virus. To this end, there would be clear benefit to expanding the use of the Global Avian Influenza Network for Surveillance (GAINS) open database and mapping system to be included as the desirable wild bird module of the Global Early Warning System (GLEWS) for transboundary animal diseases, including zoonoses— a joint initiative of FAO, OIE and WHO. Additionally, the GAINS information management system has the potential to serve the needs of many stakeholders and would benefit from more widespread mandates for its use and recognition by the relevant major organisational stakeholders, in particular FAO, OIE, WHO, UNEP, Wetlands International and Birdlife International.
3. Understanding shared data is only possible if these represent the same information. In this respect the development of international common standards is particularly important, not only as these relate to field-based methodologies (*e.g.* different types of sampling) but also to laboratory diagnostic techniques. The continued development of guidance from FAO and others is essential.
4. It is highly desirable that long-term programmes for avian influenza surveillance (H5N1 HPAI and other LPAI) are established against precisely defined objectives. These will help give a better understanding of incidence of AI in healthy wild birds. Establishment of such programmes will be difficult (*e.g.* in relation to the expected very low prevalence of AI viruses) but nonetheless continuity is an important objective.
5. FAO guidance on the planning and execution of avian influenza surveillance programmes should be further developed, possibly producing separate products for different target audiences. This might also include simplified publications for field audiences.
6. Whilst historically most research into avian influenza has related to ducks, geese, swans and waders, surveillance in the Far East has increasingly detected H5N1 HPAI in a number of other dead birds, traded birds, scavengers and predators. Some of these species, especially those that live in association with people, have the potential to act as 'bridge' species and as foci of infection. Whilst maintaining focus on waterbird surveillance, it is important that such species are included in surveillance programmes where risks are high or disease occurrence is entrenched in the poultry sector, or the disease has become endemic in the country or region.
7. The development of more strategic approaches to surveillance at regional or wider scales should be encouraged through appropriate mechanisms. Parameters to be considered in such developments include *inter alia* migratory patterns of higher risk species and the risk of

such species mixing either with other wild species and/or with poultry. This should be followed up by capacity development in terms of establishing logistic as well as human resource competence. In the short-term, this is perhaps most feasible for developed countries, from where learning and programmes can be transferred to other regions.

4. Epidemiology: tracing sources of infection

Conclusions

Integrated epidemiological investigations of occurrences of HPAI infection are fundamental to a better understanding of the natural history of H5N1 HPAI with the objective of reducing the risk of further infection: thus alleviating consequent social and economic impacts. These should explore the multiple possible paths by which this viral infection is known to be transmitted. The following issues are of high priority:

- As a component of national contingency planning, multi-disciplinary teams involving veterinary, epidemiological, biological, ornithological and other relevant expertise should be established in advance of cases of infection. These should include expertise from both governmental and non-governmental sectors.
- There remains an urgent need for better data related to the national and international trade in, and movements of, poultry and poultry products so that this information can be used in epidemiological modelling. Relevant data-bases related to poultry trade covering a range of scales from local to national and international should be established in liaison with the industry. In collecting such data, it will be important to explain to relevant stakeholders why it is required and seek their engagement.
- Avian influenza has been detected within captive birds in wildlife markets, highlighting a general lack of information about these areas as potential sources of infection. Better information on wildlife trade together with enhances surveillance within markets is highly desirable.
- Epidemiological investigations should consider linkages to wild birds as one of the possible sources of infection. Given that common things happen more frequently, such considerations should not emphasise exceptional or unlikely possibilities.
- There is a need for better epidemiological quantification of the numbers of outbreaks in domestic birds related to the various potential means of the introduction of infection.
- In regions where synthesised information on the distribution and movements of wild birds do not exist, there remain important needs to provide such information to aid both epidemiologists and decision makers. This should include tools that summarise likely movements at various scales and for various periods.
- To more readily understand the spread of infection it is crucial that there is accurate knowledge of the timing⁶ and sequence of events ('time-lines'). Time-lines, together with an understanding of which species are involved and exact locational information, are crucial to the generation of hypotheses that can then be used to direct subsequent epidemiological investigations. The importance of rapid and accurate official national reporting to OIE was stressed.
- The interpretation of cases of infection in wild birds is greatly aided by the collection of contextual information. The European Commission has published guidance which summarises key information which should be collected (Annex 3A).

⁶ To this end, the importance of clearly understanding what activities reported dates relate to was stressed. Different dates may be reported for the same samples depending on whether this refers to the date on which the sample was collected, the date it was submitted for laboratory testing, when it was tested, or even when the results were finally reported.

- The open sharing of data and information of data related to infection — both positive and negative — is critical. Yet it was recognised that in some countries and cultures there can often be strong pressures which militate against such transparency for various motives, including potential negative impacts on inward investment, or for commercial advantage. Overcoming such difficult barriers to the ready exchange and reporting of data (both within and between countries) is a crucially important issue that will require sustained and concerted efforts from all those involved.
- The provision of specialist ornithological advice to epidemiologists and other government officials responding to outbreaks is essential. Better international understanding of the various national advisory groups would allow rapid communication between national ornithological advisory groups at a regional scale (*e.g.* within Europe) so that specialist assessments and other information can be rapidly shared between countries.
- The development of epidemiological expertise in countries with limited relevant capacity would be greatly aided both by the development of guidance which outlines basic principles, together with case studies which demonstrate good practice. Care should be taken to avoid making such guidance too prescriptive so as to avoid limiting the creativity of epidemiological teams — given that many outbreaks may have unique features. There may be a need to develop different forms of guidance for developed and developing countries, and/or to differentiate between data-rich and data-poor countries.

Examples were given of a situation where the combination of several improbable events had combined to result in a case of infection. In investigating sources of infection, it is important not to jump to conclusions in the absence of thorough epidemiological investigations.

The international reporting of low quality data and information especially related to species identification continues to be a major issue. The situation has not improved over the last three years, with only 36% of all 1,671 OIE official reports identified to species level in 2006⁷. This involves issues related both to how information is collected by countries and reported to OIE, as well as how some of this information is then subsequently reported by OIE. The meeting identified several simple ways by which aspects of quality assurance could readily be built into the reporting chain⁸ and strongly recommended that OIE take an initiative to enhance the quality of data-reporting, working with Task Force members. In doing this, consideration needs also to be given as to how countries can be better motivated to report higher quality, and more precise data and information.

Key recommendations for future action

1. The ultimate objective of structured epidemiological investigations of outbreaks in domestic poultry should be to identify the most likely source of infection so that the population attributable risk can be quantified. This allows assessment of the population attributable risks as related to the potential means of introduction of infection to domestic flocks so that this can then be used to estimate the proportionate rôle of the various potential means of introduction of infection, *e.g.* poultry, poultry products, fomite transmission, wild birds, *etc.* This allows the most relevant and efficient control measures to be put in place.
2. A central element of national contingency planning should be the establishment of multi-disciplinary epidemiological teams which should involve epidemiological, veterinary, virological, biological and ornithological expertise. There are good examples of the success of this approach which demonstrates the advantage of bringing together expert ornithologists so as to be able to advise veterinarians and epidemiologists. The establishment of such national Ornithological Expert Panels is strongly recommended.
3. There are massive international movements of poultry and poultry products, although full details of these are poor, especially for informal or illegal trade. It remains an important priority to develop better information about the national and international trade in poultry and

⁷ R. Lee, WWT (unpublished)

⁸ for example by having one form specifically for the reporting of avian influenza, which is specifically designed to avoid ambiguity and which would allow for the assessment of data quality.

poultry products at various scales, including transparency issues in industry – which calls for a healthy dialogue to be promoted. As part of the process of tracing bird movements it would be valuable to undertake more field research on market chains and sales so as to better understand the nature and extent of the poultry or ornamental bird trade, fighting cock exhibits, and the like, as well as giving special emphasis to trade through wet (live bird) markets.

4. The Task Force should stimulate the development of accessible guidance which gives general principles for epidemiological investigations related to a range of different outbreak and infection scenarios, as well as best practice case studies, which would have educational value.
5. Training in epidemiological principles is important, especially where there is limited national capacity. Organisations represented on the Task Force should consider how they might assist the development of such training.
6. In regions where synthesised information on the distribution and movements of wild birds do not exist, there remains an important need to gather, collate and provide such information to aid both epidemiologists and decision makers. This should include tools that summarise the likely bird movements at various scales and for various periods.
7. Telemetry provides a valuable tool for better understanding of temporal and spatial movements of wild birds especially in relation to epidemiological investigations. The further use of this technology should be promoted.
8. To more readily understand the spread of infection it is crucial that there is accurate knowledge of the timing and sequence of events ('time-lines'). Time-lines, together with an understanding of which species are involved and exact locational information are all crucial to the generation of hypotheses that can then be used to direct subsequent epidemiological investigations and conduct meaningful phylogenetic studies based on genome sequencing data. The importance of rapid, official reporting to OIE was stressed.
9. The results of epidemiological investigations should always be published, including where these are inconclusive. Awareness of these would be facilitated by establishing hyperlinks to an international register of such investigations maintained on OIE's web-site. All organisations involved in the Task Force should continue to encourage transparency in reporting and openness in data sharing. The reporting of negative data is crucially important.

5. Communication, education and public awareness

Conclusions

There remains keen interest by the media in the spread of H5N1 HPAI and its impacts. Unfortunately, much reporting remains inaccurate. This can create political pressure for ill-advised and disproportionate policies such as the culling of wild birds and/or the destruction of their nests and wetland habitats. Conversely, an informed public can more readily assess levels of relative risk.

Communication of clear scientific messages is the key to better public understanding. Explaining issues of relative risk to the public is particularly important and the use of simple comparisons can help (*e.g.* compared to risk of a plane crashing, or a person being struck by lightning, *etc.*).

The meeting identified the following good practice on the basis of practical experience:

- Conservation organisations, scientists and veterinary services all need to work actively with the media to enhance the accuracy of reporting on this issue. This should include the development of much more effective communication strategies to give policy makers, stakeholders, and the general public more balanced information on real levels of risk and appropriate responses.

- The [AIWEb site](#) now provides a range of resources for media, and journalists should be encouraged to use this information, including the Task Force's booklet *Avian Influenza and Wild Birds*. The website and booklet should be further developed and updated.
- Do not be tempted to avoid awkward facts even if others do.
- Web-based organisational position statements should be regularly reviewed to ensure that they accurately present the current situation.
- Organisations should identify specific, informed members of staff who are responsible for media briefings and who work to a contingency and communications plan. That plan should think through, and prepare responses to potentially difficult questions.
- The provision of quotes for e-News Groups (Science Media Service) is a useful means of disseminating organisational positions.

There are several readily available guides for relating to the media, including the extensive guidance published by [IUCN's Species Survival Commission](#) which, *inter alia*, stresses **the five Fs of media relations**:

1. Fast

Respect journalists' deadlines. Return calls as pledged. An unreturned call is an incalculable 'faux pas'.

2. Factual

Be factual. But make the facts interesting. Journalists appreciate facts stated with some literary flourish.

3. Frank

Be candid. Never mislead journalists. Be as open as possible and respond to their questions.

4. Fair

Be fair to journalists if you expect them to be fair to you. Favouring one news outlet consistently will lose you the confidence of others.

5. Friendly

Like everyone else, journalists appreciate courtesy. Remember their names. Read what they write. Know their interests. Thank them when they cover your issues.

Maps and graphical representations

'A picture paints a thousand words'. Maps and graphical representations are powerful means of communication, although they also can distort reality. Particular issues which have the potential to misrepresent include:

- the inaccurate mapping of locations of infection (sometimes represented as the capital cities of the countries in which infection occurs);
- the shading of whole territories to depict the presence of infection, in situations where infection is actually restricted to perhaps one or two specific locations in one part of a territory; and
- that maps can dangerously simplify issues since they typically only show where infection is known, and not where it may be present yet unknown.

There would be benefits in the development of simple, but accurate illustrations that communicate AI-related information more accurately. These should include information on the movements and international trade in poultry and poultry products as well as of wild birds.

Key recommendations for future action

1. Those involved with avian influenza should proactively work with the media to enhance the accuracy of their reporting of science, thus improving public understanding. This should particularly involve the communication of positive messages as well as responses to negative ones. To this end, targeted briefings of journalists are helpful. The development of much more effective communication strategies is necessary to give policy makers, stakeholders and

the general public more balanced information on the real levels of risk and appropriate responses.

2. Organisations should identify specific, informed members of their staff who are responsible for media briefings and who work on a contingency and communications planning. They should expect the unexpected and prepare for it. They should stick to areas of expertise and avoid comment about other issues. Briefing of media should always be evidence-based and avoid speculation in the absence of evidence. The accuracy of facts supplied by others should be repeatedly checked before passing these to the media. Much useful information is available on the Task Force web-site (www.aiweb.info).
3. Task Force members should use the booklet *Avian Influenza and Wild Birds* for media briefings and promote its use by others. It should be reviewed and updated as necessary. English, French, Spanish, Russian, Chinese and Arabic versions are now available. However, the Task Force should also develop a media 'tool kit' that brings together national and organisational media best practice and Frequently Asked Questions. This should include factual information that may be adapted for specific national needs and uses.
4. At present much guidance related to H5N1 HPAI is published in a limited range of languages. It is important to translate guidance into a wider range of other, and more local, languages so as to facilitate its dissemination.
5. The Task Force should stimulate the publication of simple bird identification guides in local languages so as to assist field-based staff responses to cases of infection. A web-based list or directory of experts that could assist (at a distance) in identification of bird species based on photographs would also be highly desirable.
6. The degradation of the health of ecosystems as documented by the Millennium Ecosystem Assessment and especially in the decline in extent and condition of wetlands is considered to have had a rôle in the evolution and spread of H5N1HPAI. This environmental change has created the conditions where there is closer contact and mixing between people, livestock (including poultry and domestic ducks), and wild waterbirds, potentially resulting in cross-infections. Reducing the opportunities for such contacts through preventing further loss of wetlands, improving mechanisms for the maintenance and wise use of wetlands is an important long-term requirement. To this end it would be valuable to develop and disseminate practical guidance, *inter alia* in collaboration with the Ramsar Convention.

6. Research and data needs

Conclusions

- There remains an important need to make data and information more readily available for decision makers and others who lack a technical understanding of ornithological information. Integrated syntheses of ringing and waterbird count data in the form of flyway atlases are important means by which this can be undertaken. Availability of information on birds at the level of the individual site is also important in responding to outbreaks and should always be included in response planning.
- Collaboration with existing waterbird research programmes would provide a cost-effective means of taking forward the implementation of satellite telemetric and other studies that aim to better understand waterbird migration and movements.
- Understanding better the behaviour and ecology of 'bridge' species that live in close proximity to man and poultry remains a priority area of research. This research is directly relevant to risk assessments and developing practical guidance for enhancing biosecurity.
- There remains a need to develop better understanding of levels of normal mortality levels in waterbirds.

Key recommendations for future action

1. There remains a need to develop a better understanding of the behaviour and ecology of 'bridge' species, as well as other means of the local or short distance spread of HPAI infection, such that this information might be used to develop enhanced guidance on biosecurity and contribute to risk analysis
2. It would be valuable to have a better understanding of the duration of viral shedding by bird species likely to be held in captivity. This would inform possible response strategies for zoos and collections in the event of infection outbreaks.
3. Better monitoring and surveillance for avian influenza within markets that trade in wildlife, is highly desirable. This should include research into which species are traded, their origins and movements.
4. There remains a need for better information on relevant cultural and religious practices, such as the widespread purchase and release into the wild of birds at certain times of the year (*e.g.* merit releases), and how those practices might be safeguarded but at the same time, minimize the risk of disease spread to humans, wild birds, and poultry.
5. H5N1 HPAI has affected several non-avian species, although knowledge of its ecology in these taxa is particular poor. Those species that have been infected are thought to be accidental, dead-end hosts, and there is no current evidence for them being involved in the maintenance of infection in any area. However, there is a need to continue to assess this issue during epidemiological investigations as it is possible that in the future a mammalian species may become a maintenance host and thus spread H5N1 HPAI locally.
6. Knowledge of the degree to which H5N1 HPAI may be passed between different bird species (and whether this happens asymptotically or not) is important information that could help refine risk assessments. Research which leads to the development of serological tests for avian influenza antibodies in different species of birds will ultimately provide the most useful epidemiological information. Serological testing in past LPAI outbreaks has given important insights. Basic research on the immunological responses to H5N1 HPAI infection by birds (possibly using a representative avian model in one species) is important. A current priority is to develop validated serological diagnostic tests for the full range of bird species potentially at risk.
7. There remains a need to continue to gather, collate and co-ordinate data and information on wild bird distributions, their movements, stop-over sites and flyways. Satellite telemetry is a particularly valuable tool for this work. It is also important to continue to gather data at site level, since such local information is very limited in many parts of the world.
8. For many, access to the most recent scientific literature is constrained by inability to subscribe to expensive on-line journals, thus hindering understanding. The Task Force should help tackle this issue, possibly by working with authors to make the most relevant scientific literature available on [AIWeB](#) and web-based resources, or by investigating the potential for corporate sponsorship.

6. Finances

Key recommendations for future action

1. Recent events with respect to avian influenza have focussed attention on the need for resources to develop national veterinary capacity and programmes of surveillance and monitoring for wildlife diseases, especially zoonoses, but also to develop background information on wild birds, and especially their movements. A good start has been made, but there remains the need for further investments, particular to allow the development of the wildlife disease sector.
2. The Scientific Task Force on Avian Influenza has provided a valuable co-ordination function between its many collaborating organisations. Financial resources are required to facilitate its continued operation.

Annex 1

Guidance and key sources of information

Contingency planning and risk assessment

General

- [Opinion of European Food Safety Authorities' \(EFSA\) Panel on Animal Health and Welfare and their *Scientific report on migratory birds and their possible role in the spread of Highly Pathogenic Avian Influenza*](#). Risk assessment for the EU regarding the potential for the arrival and spread of H5N1 in the EU by European Food Safety Authority (2006).
- [EFSA Opinion adopted by the AHAW Panel related to *Animal health and welfare risks associated with the import of wild birds other than poultry into the European Union*](#) European Food Safety Authority (2006).
- [National web-sites of EU Member States dealing with H5N1](#)
- [Manual on the preparation of national animal disease emergency preparedness plans](#). FAO (1999).
- [National contingency and avian/human pandemic influenza preparedness plans](#). Web-links to 35 national plans compiled by FAO.
- [Wildlife trade and global disease emergence](#). (Karesh, W.B. *et al.* 2005).

Poultry holdings

- [Preparing for Highly Pathogenic Avian Influenza: a manual for countries at risk](#). FAO & OIE (2006).
- [Avian Influenza Incursion Analysis \(through wild birds\)](#). British Trust for Ornithology Research Report No. 448. (2006) (12.2 MB file)

Nature reserves and wild birds

- [Urgent preliminary assessment of ornithological data relevant to the spread of Avian Influenza in Europe](#). Wetlands International, (2006).
- [Methodology for rapid assessment of ornithological sites](#) Wetlands International (2006). See also example [assessments of example European wetlands](#).
- [Guidelines for Reducing Avian Influenza Risks at Wetland Protected Areas of International Importance for Migratory Waterbirds](#). R.C. Prentice (in prep). Available from the web-site of the [UNEP/GEF Siberian Crane Wetlands Project](#) from September 2007.
- [Ramsar Convention Resolution IX.23 on Highly pathogenic avian influenza and its consequences for wetland and waterbird conservation and wise use](#) (November 2005).
- [The Ramsar Wetland Risk Assessment Framework](#). (Adopted by Ramsar Resolution VII.10; 1999).
- The Ramsar "Toolkit" 3rd Edition ([Ramsar Handbooks for the Wise Use of Wetlands](#)).

Zoos and collections

- [Advice from the British and Irish Association of Zoos and Aquariums on avian influenza](#).
- [BIAZA guidelines on vaccinating birds against Avian Influenza](#). British and Irish Association of Zoos and Aquariums (September 2006).

- [Risk assessment: avian influenza in public parks/parkland & open waters due to wild bird exposure](#). (UK Health Protection Agency/Department for Environment Food and Rural Affairs, 2006).

Responding to avian influenza infection

- Prevention and Control of Avian Flu in Small-scale Poultry: A guide for veterinary paraprofessionals. [A guide for veterinary paraprofessionals in Vietnam](#) and [A guide for veterinary paraprofessionals in Cambodia](#). FAO [Also available in [French](#), [Indonesian](#), [Kyrgyz](#), [Laoatian](#), [Russian](#), [Spanish](#) and [Vietnamese](#)].
- [Summary record of the Joint meeting of the Standing Committee on the Food Chain and Animal Health and of the Ornis Committee, Brussels, 1 December 2006](#). (Includes a review of HPAI outbreaks in the EU 2005-2006).
- [Interim Guidance for Protection of Persons Involved in U.S. Avian Influenza Outbreak Disease Control and Eradication Activities](#). US Centers for Disease Control and Prevention (2006).
- [Avian Influenza: Protecting Poultry Workers at Risk. US Safety and Health Information Bulletin](#). U.S. Department of Labor, Occupational Safety and Health Administration (2004).

Surveillance and early warning systems

- [EU Guidelines for AI surveillance in wild birds and poultry in 2007](#). European Commission, DG SANCO (2007).
- [Guidelines on the implementation of survey programmes for avian influenza in poultry and wild birds to be carried out in the Member States in 2007](#). European Commission, DG SANCO (2006).
- [Guiding Principles for Highly Pathogenic Avian Influenza Surveillance and Diagnostic Networks in Asia](#). FAO (2004).
- [Wild Bird HPAI Surveillance: sample collection from healthy, sick and dead birds](#). FAO (2006).
- [Wild birds and Avian Influenza in Africa: summary of surveillance and monitoring programmes](#). Wetlands International, CIRAD & FAO.
- [Global Avian Influenza Network for Surveillance \(GAINS\)](#)
- [Results of EU avian influenza surveillance](#). European Commission, DG SANCO.
- [EU Animal Disease Notification System](#). European Commission, DG SANCO.
- Emergency assistance for early detection and prevention of Avian Influenza; Terms of Reference for Participants in Field Sampling Missions. Wetlands International internal guidance (2006).

Health and safety guidance

- [Diseases from birds, with particular reference to Avian Influenza](#). UK guidance to bird ringers; British Trust for Ornithology (March 2006).
- [Working with highly pathogenic avian influenza virus](#). UK Health and Safety Executive guidance.
- [Risk assessment: avian influenza in public parks/parkland & open waters due to wild bird exposure](#). UK Health Protection Agency/Department for Environment Food and Rural Affairs (2006).

Epidemiology: tracing sources of infection

- [Epidemiology of H5N1 Avian Influenza in Asia and implications for regional control.](#) (2005).
- [Outbreaks of H5N1 HPAI virus in Europe during 2005/2006: an overview and commentary.](#) UK Department for Environment Food and Rural Affairs (2006). [3.4 MB]
- [Guidelines on the implementation of survey programmes for avian influenza in poultry and wild birds to be carried out in the Member States in 2007.](#) European Commission, DG SANCO (2006).
- [Summary epidemiological report on a H5N1 HPAI case in turkeys in England, January 2007](#) which illustrates the modus operandi of the UK Ornithological Expert Panel in a structured epidemiological investigation. UK Department for Environment Food and Rural Affairs (2007).

Communication, education and public awareness

- [IUCN Species Survival Commission Media Guide](#)
- [Science and Development Network: Dealing with the media](#)
- [Green Guide to effective PR](#)
- [Civicus Toolkit on handling the media](#)
- [AIWEb](#) media pages

Annex 2

Progress since the 2006 Scientific Task Force on Avian Influenza seminar in Nairobi

Contingency planning and risk assessment

- Many national risk assessments and contingency plans have now been developed. However, full implementation of these remains an issue in some countries, and further, [many such assessments](#) relate more to human pandemic influenza contingency planning than to other aspects of avian influenza assessments in poultry or wildlife populations. There remains a need to better collate such risk assessments, through either a clearing house mechanism or an active collaboration between agencies or institutions.
- Wetlands International and EURING have produced, with funding from the European Commission, a [synthesis of data and information](#) related to waterbird distribution, numbers and movements in Europe and analyses to predict migratory patterns is being produced at the moment. This has helped to develop risk assessments for the EU, including those related to species and locations. There remains a pressing need for similar assessments to be undertaken for Neotropical, African and Asian flyways for which such assessments remain lacking.
- There has been growing awareness of eco-health issues and the unsustainable nature of intensive poultry production processes.

Surveillance and early warning systems

- There has been generally good development of more strategic programmes of surveillance in wild bird populations partly based on risk assessments within the European Union, although progress elsewhere has been more limited. The recommended establishment of long-term AIV surveillance programmes in strategically important mixing/staging areas used by migratory birds has still to be developed.
- The funding of the NEWFLUBIRD programme by the European Commission has been a significant development. This provides a multidisciplinary network for early warning system for influenza viruses in migratory birds in Europe. The network includes ornithological studies and sampling, virus detection, isolation and characterisation and data processing for early warning and risk evaluation, and it brings together a multi-disciplinary consortium involving virologists, epidemiologists, modellers and ornithologists, liaising with relevant international organisations and policy makers. It is a potential model for other geographical regions.
- The development of the Global Avian Influenza Network for Surveillance (GAINS) has valuably started to provide wider international perspectives on the extent and location of current surveillance for avian influenza viruses.
- There remains a need to develop regional 'hubs' for AI reporting (such as for example is provided by the EU and COMESA). Regional overview of reporting continues to be desirable in other parts of the world, for example in East, South-East and Central Asia, and the Neotropics.
- The Global Early Warning System (GLEWS) for transboundary animal diseases, including zoonoses— a joint initiative of FAO, OIE and WHO — has been developed. As highlighted in Nairobi, it remains desirable to augment GLEWS such that it has the capability to better track and report on H5N1 HPAI in populations of wild birds.

- The development of capacity to undertake national programmes of surveillance for avian influenza remains a major issue. Significant progress has been made in the framework of the FAO Technical Co-operation Programmes (Africa, Middle East and Eastern Europe) including the implementation of surveillance programmes by CIRAD and Wetlands International in Africa which have had a training element.
- [Programmes of satellite telemetry](#) of migratory waterbirds in Africa, Mongolia and China by FAO, the US Geological Service, CIRAD and Wetlands International have combined to make a better understanding of migration patterns.

Communication, education and public awareness

- The development of the [AIWEb site](#) has been a major development in providing a access to a wide range of information about avian influenza targeted as a number of separate audiences.
- A leaflet on avian influenza and wild birds has been developed by the Task Force and published in Chinese, English, French, Spanish, Russian and Arabic versions.

Annex 3

Recommended ornithological information to be collected during surveillance programmes or the field assessment of mortality events in wild birds⁹

A. Useful information to be collected:

1. All birds from which samples are taken should be identified to species. Where clearly distinguishable sub-species or discrete populations exist as for some geese, this information should also be collected and reported¹⁰. Age¹¹ and sex should be recorded wherever possible.
2. Close collaboration with ornithologists in the capture and sampling of live birds not only facilitates identification of birds but also gives the opportunity to collect additional information on the sampled live birds (such as weight, age, sex and condition), important to developing better understanding of viral ecology and epidemiology. Standard protocols exist for the collection of such data through national ringing schemes (details of which are available via EURING¹²). Recording individual ring numbers¹³ in the reporting spreadsheet provides a means of accessing these data for future analysis.
3. To provide an audit of identification, it is highly desirable that a clear digital photograph¹⁴ is taken of each sampled bird (especially those found dead and/or not identified by ornithologists) and stored at least until confirmation of laboratory tests. In the event of positive results further examination of such photos can provide additional information on the age and sex of the bird, in addition to proving the identity of the species beyond doubt and thus allowing the case to be correctly put into context. To facilitate this, each individual bird should be given a code that is used on the cloacal and oro-pharyngeal swabs taken, and this code should be on a piece of card that is visible in each photograph taken.
4. Especially related to sampling in the vicinity of outbreaks, it is desirable to collect a range of contextual information so as to better understand the viral epidemiology of H5N1 HPAI in wild bird populations. Such information should include:
 - a. clear locational and descriptive data about the catching site, ideally GPS co-ordinates, and including habitat description (*e.g.* lake, river, village pond, fish farm, *etc.*) and distance to human settlement, agricultural land, and poultry farms;
 - b. record of the numbers of each species of other live birds in the sampling area that were not sampled;
 - c. if available, records of bird movements (arrivals/departures) which occurred at the sampling site prior to the sampling;
 - d. assessment of the numbers of each species of live bird in the sampling area that were not sampled but that were showing signs of ill health; and

⁹ Based on [Guidelines on the implementation of survey programmes for avian influenza in poultry and wild birds to be carried out in the Member States in 2007](#). European Commission, DG SANCO, 2006.

¹⁰ Wetlands International's publication *Waterbird Population Estimates* [[Wetlands International 2006. Waterbird Population Estimates - Fourth Edition. Wetlands International, Wageningen, The Netherlands. 239 pp.](#)] should be used as a source of information on the taxonomy and populations of waterbirds.

¹¹ Waterbirds are aged mainly by the size and shape of their wing feathers (mainly on greater covert and tertial shape - [www.bto.org/ringing/ringinfo/resources/topography.pdf](#)) and their tail feathers (juveniles having notched tail feathers).

¹² [www.EURING.org](#)

¹³ Records of previously ringed or colour-ringed birds provide especially valuable information and should always be reported to national ringing offices or to EURING - [www.ring.ac](#). Colour-rings on birds should always be photographed *in situ*.

¹⁴ In order to facilitate identification of bird species (which can sometime vary in quite minor plumage details, especially at certain times of the year), photographs should be taken according to the guidance given in part B of this Annex.

- e. given that birds of some species (such as Mallards *Anas platyrhynchos*) can occur either as free-living birds which are able to move between sites, or occur in a feral state, habituated to foods provided by man, distinguishing between these categories would be useful. Sometimes the presence of unusual plumage patterns - indicating domestication - is useful in this respect.

B. Guidance on taking photographs of dead birds for identification purposes

The following simple guidance will assist non-specialists in taking photographs, especially of dead birds, that will allow subsequent identification to species. Different bird species are identified by differing characteristics, so it is difficult to provide universal guidance applicable in all situations. However, the following is a minimum standard that should be followed.

All wild birds collected for analysis for HPAI should have digital photographs¹⁵ taken as soon as possible after collection. The bird should fully fill the photograph and wherever possible include a ruler or other scale measure.

Photographs should be taken of:

- the whole bird, dorsal side, with one wing stretched out and tail spread and visible;
- the head in profile clearly showing the beak;
- close-up photos of the tips of wing feathers can often determine whether the bird is an adult or a juvenile (bird in its first year);
- ideally photographs of both dorsal and ventral views of the bird should be taken¹⁶; and
- any ventral photographs should show the legs and feet (since leg colour is often an important species diagnostic). If any rings (metal or plastic) are present on the legs, these should be photographed *in situ* as well as recording ring details.
- Any conspicuous markings/patterns should be photographed.

At certain times of the year, such as late summer (July - late August in the northern hemisphere) many waterbirds, and especially ducks and geese, undergo moult and can be especially difficult to identify by non-specialists. At such times clear photographs are especially important to aid identification of (duck) carcasses. The patch of colour on the open wing (called the "speculum") is often especially useful. The identification of young gulls at any time of the year is also difficult and typically they will also need to be photographed and identified by specialists.

Photographs should be retained, linked to an individual specimen, at least until laboratory tests are returned as negative for avian influenza.

Photographs can be used immediately if identification of the species of bird is in any doubt, and for subsequent checking of the identification if necessary.

A unique code or reference number, which is the same as the code or reference number of any samples taken from the birds should be visible in each photograph so as to link samples and photographs.

¹⁵ Each photograph should be taken at the highest resolution possible and if the camera has a 'date stamp' feature then this should be enabled so that the image is saved with a time reference – this may help verify the sequence of images taken at a site on a day. Images should be downloaded to a computer as soon as possible and information about location and date added to the file properties.

¹⁶ Photographs of the upper and under surfaces of the wing and spread tail will facilitate aging and sexing of birds (e.g. Northern Pintail *Anas acuta*).

Glossary

AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
AI	Avian influenza
AIV	Avian influenza virus
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement (France)
CMS	Convention on the conservation of Migratory Species
COMESA	Common Market for Eastern and Southern Africa
FAO	UN Food and Agriculture Organisation
GAINS	Global Avian Influenza Network for Surveillance
GLEWS	Global Early Warning System for transboundary animal diseases, including zoonoses (FAO, OIE, WHO)
GPS	Global Positioning System
HPAI	Highly Pathogenic Avian Influenza
LPAI	Low Pathogenic Avian Influenza
NEWFLUBIRD	Network for Early Warning of Influenza Viruses in Migratory Birds in Europe
OIE	World Organisation for Animal Health
WWT	The Wildfowl & Wetlands Trust, UK