CONVENTION ON WETLANDS (Ramsar, Iran, 1971)
36th Meeting of the Standing Committee
Gland, Switzerland, 27-29 February 2008

DOC. SC36-27

Agenda item 12.2

STRP draft Resolution and guidance on Highly Pathogenic Avian Influenza (HPAI)

Action requested: The Standing Committee is requested to review the attached proposed draft Resolution and annexed guidance and consider adopting it for finalization, translation, and eventual transmittal to COP10.

Note from the Ramsar Secretariat

Request for consideration of additional document by the 36th meeting of the Standing Committee

1. Following the highly successful 14th meeting of the Scientific & Technical Review Panel last week (28 January-1 February 2008), the outcomes of which will be reported to Standing Committee under Agenda items 6. and 12., the Secretariat has assessed the significant number of documents to be prepared for submission to COP10 and is becoming increasingly concerned that the Secretariat will face considerable difficulties in ensuring that the final editing, and particularly the translatiing, of all such COP10 documents can be completed in the short period between the end of the 37th meeting of the Standing Committee (6 June 2008) and the deadline of 25 July 2008 on which all such materials must be distributed to Contracting Parties.

2. During STRP14 very significant progress was made in finalizing some of the guidance materials from the Panel for COP10 consideration. In particular, the Panel's task team on issues concerning Highly Pathogenic Avian Influenza, led by STRP member David Stroud, have advised the Secretariat that their proposed draft COP10 Resolution and its annexed "Guidance on responding to the continued spread of highly pathogenic avian influenza H5N1" are now very close to finalization.

3. Given that this is one of the larger and more complex documents being prepared by the STRP for Standing Committee and COP10 consideration, and that it will therefore take the Secretariat some time to final-edit and translate it, the Secretariat is transmitting this technical guidance document to the Standing Committee at this point, immediately after STRP14, with the request that the Standing Committee consider approving this STRP guidance for finalization and translation at its 36th meeting.

4. The technical guidance on HPAI prepared by the STRP is in the form of a 'guide to the available guidance' based around a set of risk-based scenarios concerning preparing for, and responding to, outbreaks of avian influenza in relation to wetland and waterbird issues. The STRP's task team have advised the Secretariat that the only further significant changes they anticipate needing to make to this draft guidance are a) some small updates to the Scientific Summary (Appendix 1), and b) the addition of links and references to some of the available guidance documents in the listings in section 2.3 of the guidance document.

5. In view of this, and whilst recognizing that the formal deadline for submission of papers for the Standing Committee's consideration at SC36 has passed, in order to assist in ensuring the smooth and efficient preparation of COP10 materials the Secretariat would be most grateful indeed if the Standing Committee could consider adopting this attached STRP guidance product during its 36th meeting for finalization, translation, and eventual transmittal to COP10.

Draft Resolution X.[x]

Guidance on responding to the continued spread of highly pathogenic avian influenza H5N1

1. CONSCIOUS of the continued spread of highly pathogenic avian influenza (HPAI) subtype H5N1 of Asian lineage across Eurasia and into Africa, the implications of this disease on livelihoods and human health, and direct and indirect implications on conservation of waterbirds and their wetland habitats, including at Ramsar sites and other protected wetlands; and UNDERSTANDING that control of this disease within the poultry sector will reduce risks to wetlands and wild waterbirds;

2. VERY CONCERNED at reported instances of the destruction of waterbirds, their nests, and wetland habitats, as both misguided and ineffective responses to the spread of HPAI H5N1 which, as stressed by Resolution IX.23 on *Highly pathogenic avian influenza and its consequences for wetland and waterbird conservation and wise use*, does not amount to wise use;

3. RECOGNIZING that issues related to HPAI H5N1 outbreaks affect many sectors and thus in order to address risk reduction and to maximise response effectiveness, fully integrated responses are needed (at both national and international levels), with common visions, engagement and coordination between stakeholders, including effective co-ordination within governments as a critical need, as well as close co-operation between MEAs and other relevant international and national organisations;

4. COGNIZANT that the implementation of response strategies for HPAI H5N1 will involve various approaches according to particular national situations and extent of disease prevalence;

5. NOTING the continuing lack of understanding of the role of wild birds in the possible transmission and spread of HPAI H5N1, the important need to undertake and report epidemiological investigations following cases where HPAI H5N1 infection is found in wild birds — whether associated with outbreaks in poultry or not — so as to learn from these and in order to reduce future risks;

6. CONSCIOUS that capacity development and training are essential to all responses to this and other emerging infectious diseases, giving wider benefits to other aspects of wetland conservation, yet in many countries this remains a major issue requiring attention, especially within the veterinary sector;

7. AWARE that long-term success of disease control measures will depend critically on developing better public awareness of and education about relevant issues, especially with stakeholders in particular poultry keepers, the media, the public, wetland site managers and those within government;

8. RECALLING the request from COP 9 to STRP to develop practical advice to assist countries to respond to this serious and rapidly developing situation, and to report this to COP 10;

THE CONFERENCE OF THE CONTRACTING PARTIES

9. STRONGLY REAFFIRMS the conclusion of Resolution IX.23 that attempts to eliminate HPAI in wild bird populations through lethal responses such as culling are not feasible and may exacerbate the problem by causing further dispersion of infected birds and that destruction or substantive modification of wetland habitats and waterbird nest sites with the objective of reducing contact between wild birds and humans and their domestic birds does not amount to wise use as urged by Article 3.1 of the Convention;

10. ENCOURAGES stakeholders to plan and test response strategies at national, local and site scales according to level of risk and, where possible, conduct this planning at times of low risk prior to outbreak situations;

11. STRONGLY ENCOURAGES Contracting Parties and other governments to establish arrangements to involve those with specialist ornithological expertise to advise governments on the gathering, use and interpretation of relevant data and information in developing risk assessments, wild bird surveillance strategies and programmes, appropriate response strategies and the implementation of epidemiological investigations in the event of outbreaks of HPAI, so that these responses are made on the basis of best available information;

12. URGES the further development of information tools for decision makers that collect and then synthesize relevant data and information on waterbirds and wetlands (such as preparation and use of wetland inventories, information on distribution, abundance and movements of birds), as well as that related to the movements of poultry and poultry products as a critical part of preparing risk assessments at various scales, as well as a part of essential contingency planning;

13. STRESSES the need for surveillance programmes to follow international scientific standards as defined *inter alia* by the UN Food and Agriculture Organisation ensuring high quality data to facilitate successful epidemiological investigations;

14. URGES Contracting Parties and other governments to co-operate internationally in: under-pinning research programmes, surveillance in response to outbreaks, the undertaking of risk assessments, and the exchange and sharing of relevant data, information, and samples from surveillance programmes especially at times of heightened risk and using initiatives such as the Global Avian Influenza Network for Surveillance (GAINS);

15. EMPHASISES the need for improving capacity for surveillance and response strategies, understanding that structures and capability for avian influenza control will aid control of future disease problems affecting wetland biodiversity and livelihoods.

16. ADVOCATES the development of communication programmes aimed at promoting balanced understanding and awareness of actual risks and appropriate responses in a range of stakeholder groups including poultry keepers (to reduce risks to human health and increase early disease diagnosis); the public and media to reduce inappropriate responses; and the public to aid in public reporting for surveillance programmes; and wetland site managers to improve contingency planning;

17. WELCOMES the broad consensus on approaches and responses developed between UN agencies, international conventions and other international organisations;

18. ACCORDINGLY STRONGLY ENCOURAGES the continuing work of the Scientific Task Force on Avian Influenza and Wild Birds to keep this developing situation under review especially as regards wetlands, and REQUESTS the continued participation in its work by the Convention working through the STRP and the Secretariat;

19. REQUESTS STRP to determine whether lessons learnt from best practice responses to HPAI H5N1 have implications for Ramsar guidance relating to protected sites and other aspects of wetland wise-use, and to suggest any such resulting modifications to guidance to COP 11; and

20. ADOPTS the guidance annexed to this Resolution on responding to the issues raised by the spread of HPAI H5N1; URGES Contracting Parties and other governments to implement this guidance and further disseminate it to other interested parties (including its translation into local languages); and FURTHER REQUESTS the Secretariat and STRP to assist, with relevant international agencies and the Scientific Task Force on Avian Influenza and Wild Birds, to continue to develop guidance that will assist countries effectively to respond to the continued spread and re-emergence of HPAI H5N1, and to report progress to the Standing Committee and COP 11.

Annex

Ramsar guidance on responding to the continued spread of highly pathogenic avian influenza H5N1

CONTENTS

1 INTRODUCTION AND MANDATE

Disease can have significant impacts on wildlife populations, and is of special concern for species of conservation importance that have small populations. Many wildlife diseases are zoonotic, not only affecting wild and domestic animals, but also having the capacity to affect humans.

Avian influenza is a widespread disease, which occurs naturally within some waterbird species. The spread of infection with these viruses to a range of other species, including humans, is well-known. The emergence and spread of highly pathogenic avian influenza H5N1 of Asian lineage (HPAI H5N1) since 2003 has been historically unprecedented both in the extent of geographical range of the virus and its high pathogenicity to wild birds (as opposed to only domestic birds). It has had major impacts on rural livelihoods linked to the keeping of domestic birds (mainly chickens, ducks, turkeys, ostrich and quail) and on nature conservation, including mortality of waterbirds at many Ramsar sites. There have also been major concerns as to the potential for viral change that might precipitate a human influenza pandemic given the high mortality rate of people who have become infected with H5N1.

Addressing issues raised by the spread of HPAI H5N1 — a zoonosis that has attracted widespread media attention and the attention of decision makers within governments - gives an important opportunity to promote effective structures and policies that can also provide models for the control of other emergent diseases. This is an important objective since wildlife disease is increasingly and correctly recognised as a central issue for conservation managers, apart from its significant impact on domestic animals and human health.

The UN Food and Agriculture Organisation (FAO) and the World Organisation for Animal Health (OIE) are leading efforts to control avian influenza within the agricultural sector (poultry industry), while measures to contain the spread of avian influenza H5N1 as the potential source of a global pandemic affecting human populations are being coordinated by the World Health Organisation (WHO).

Ramsar's ninth Conference of the Parties (CoP 9) in 2005 recognised that - as well as the direct impacts of HPAI H5N1 on susceptible birds - public attitudes and therefore support for wetland conservation, particularly of Ramsar sites and other wetlands of importance for waterbirds, could be negatively affected by concerns as to the possible role of waterbirds in the spread of HPAI H5N1. Parties were also greatly concerned that in many countries there was a significant lack of information and, in some countries, public misunderstanding, on important issues related to the spread of HPAI, the risks it may pose, and how to anticipate and respond to outbreaks of HPAI. Accordingly CoP 9 agreed Resolution IX.23 on *Highly pathogenic avian influenza and its consequences for wetland and waterbird conservation and wise use*. *Inter alia* this called on STRP to develop practical advice to assist countries to respond to this serious and rapidly developing situation, and to report this to CoP 10.

Since November 2005, there has been further spread of this virus westwards through Eurasia and into Africa.

The positions and recommendations of the main international conventions and agreements concerned with the conservation of wild birds, including the Convention on Biological Diversity (CBD), Convention on Migratory Species (CMS) and the Ramsar Convention, have been set out in Resolutions from their respective Conferences of Parties (see Section 2.3). In addition, the Scientific Task Force on Avian Influenza and Wild Birds (Appendix 2) established by CMS and

now co-convened with FAO, is coordinating international scientific advice including on the conservation impact of avian influenza. The Task Force website provides access to a wide range of resources on avian influenza, wildlife and the environment: www.aiweb.info.

Further experience since Ramsar CoP 9 in 2005 has been gained with respect to the establishment of surveillance systems for the virus and with respect to responding to cases of infection. Important lessons include:

- That there is a need for risk assessment and response processes at various scales, including the preparation and implementation of cross-sectoral national contingency plans involving all relevant parts of government. Such planning is central to preparing and responding to HPAI outbreaks, and should be undertaken, wherever possible, before disease occurs.

- That the development and implementation of surveillance and early warning systems valuably informs responses. These schemes should be developed on the basis of best practice international guidance, be undertaken to the highest standards - including validation and quality assurance of data - and be implemented using strategic approaches at regional or wider scales informed by risk assessments.

- That accurate identification of wild birds, either captured as part of surveillance programmes, or reported from infection outbreaks is critical to the understanding the epidemiology of the disease and thus the processes of risk assessment.

- That whilst there now is a wide range of guidance on issues concerning HPAI H5N1, this is mostly in just a few international languages, and there is an important need to ensure that key elements are made more widely available to stakeholders and others via other languages.

- That there has been a welcome increase in the amount of surveillance, including the development of national and regional early warning systems. The development of the Global Avian Influenza Network for Surveillance (GAINS) has been a very positive development, which has facilitated the sharing of relevant data and information at international scales. Yet the quality of much ornithological information from AI surveillance programmes is often poor, especially with regard to the precise identification of bird species. The involvement of ornithologists in these programmes would help resolve these issues as recommended by the Scientific Task Force on Avian Influenza and Wild Birds (Appendix 2).

- New methodologies, such as the wider application of satellite telemetry have the potential to provide information on the movements of wild birds especially at flyway scales, and thus can better inform risk assessments.

- That there remains a need for further analysis of ornithological datasets, and research on a range of issues related to the potential role of waterbirds in possibly transmitting infection.

2 GUIDANCE RELATED TO PREPARING FOR AND RESPONDING TO OUTBREAKS OF HIGHLY PATHOGENIC AVIAN INFLUENZA, ESPECIALLY AT WETLANDS

2.1 Introduction

Ramsar CoP 9 requested the STRP, with the Scientific Task Force on Avian Influenza and Wild Birds, to provide relevant input on practical measures to reduce the risk of disease transmission between wild, captive and domestic birds, to those agencies developing contingency and wetland management plans related to HPAI H5N1; to share this information, including practical advice that will assist countries to respond to this serious and rapidly developing situation, and to report to CoP 10.

There is now a large body of guidance related to responding to the challenges of the spread of HPAI H5N1, including much material made available through FAO & OIE websites (see Section 2.3). This includes guidance related to surveillance, enhancing biosecurity, contingency planning and preparation, as well as responding to outbreaks of HPAI infection.

This 'guide to avian influenza guidance' aims to summarise the significant body of information that has been published (mostly since 2005) and which is of potential utility to Ramsar Contracting Parties and others governments and organisations.

Available guidance (Section 2.3) has been arranged under a number of separate issues:

1. Risk assessment;
2. Contingency planning;
3. Expert advice and integration within government;
4. Surveillance and early-warning (wild birds);
5. Epidemiological investigations (response and reporting);
6. Communication, education and public awareness, including media handling; and
7. Guidance for other stakeholders including relevant statutory bodies.

2.2 A guidance framework

Table 2.1 provides a 'road-map' to this guidance according to level of risk of HPAI incursion to a country. This is organised around five 'risk' levels:

- **Low risk** (No known infection in geographical region)
- **Medium risk** (Spreading infection in wild birds or poultry in region)
- **High risk** (Infection in neighbouring countries/regions)
- **Immediate risk** (Active infection in a country affecting either wild birds or poultry)
- **Post infection** (following an incursion of HPAI)

For each issue (for example contingency planning) and at each risk level (above), Table 2.1 provides an introduction to main issues to be considered and the principle sources of guidance that are available. **Note, however, that this table does not provide a definitive summary of legal obligations under the auspices of other relevant international organisations.**

A further – cross-cutting – theme of capacity development is of very great importance and underpins the ability to respond in all issues and at all risk stages. Relevant guidance is separately highlighted in Table 2.1.

Table 2.1. A guide to avian influenza guidance: a conceptual map of responses. Numbers relate to specific guidance listed in Section 2.3.

	Risk assessment	**Contingency planning**	**Expert advice & integration within government**	**Surveillance & early-warning (wild birds)**	**Epidemiological investigations (response & reporting)**	**Communication (CEPA) & media issues**	**Other stakeholders including relevant statutory bodies**
Low risk No known infection in geographical region	As part of the development of a contingency plan, establish arrangements for developing risk assessments Undertake risk assessment in discussion with Ornithological Expert Panel (OEP – Section 5 [1,2] Develop information tools to assist decision making [8, 9, 10]	Develop contingency plan for appropriate area (including wetland sites [11, 13, 14, 17], captive collections [15,16]) in consultation with appropriate stakeholders and experts [4, 2, 5, 3, 7] Collaboration with neighbouring countries [14] Ensure contingency plans are in line with relevant international and national obligations, *inter alia*, for nature conservation and animal health [12]	Identify relevant multi-disciplinary expertise [12] Establish Ornithological Expert Panel (OEP – Section 5) processes & arrangements [39] Identify OEP links with neighbouring countries Develop information tools to assist decision making [8, 9, 10]	Develop national strategy [23,24,25] - Lists of potentially higher risk species [1] and areas - Consultation - International co-ordination Determine capacity dev needs and address shortcomings Implement strategy [26, 27, 28, 33, 34, 46] Ensure provision of data to GAINS [30] and/or other reporting hub(s)	Identify multi-disciplinary expertise Establish arrangements with multi-disciplinary epidemiological teams Establish protocols	Establish media strategy in context of the National Contingency Plan [14 CEPA, 40-43] Develop media tool kit [44, 45] – including frequently asked questions, maps, positive stories, images, etc. Publish relevant explanatory materials on appropriate web-sites Identify organisational spokespeople and appropriately train them	Develop and maintain contact networks with appropriate stakeholders and establish communication procedures Establish dialogue regarding best practice biosecurity [18] Disseminate best practice health and safety guidance to relevant stakeholders [20,21,34]

	Risk assessment	Contingency planning	Expert advice & integration within government	Surveillance & early-warning (wild birds)	Epidemiological investigations (response & reporting)	Communication (CEPA) & media issues	Other stakeholders including relevant statutory bodies
Medium risk Spreading infection in wild birds or poultry in region	Update risk assessment in discussion with OEP and neighbouring countries/regions	Implement appropriate processes of contingency plans	Undertake risk assessment in discussion with OEP	OEP to consider need for enhanced surveillance		Update media tool kit and explanatory materials [44] Consider briefing appropriate media on relevant issues	Review and update contact network Brief appropriate stakeholders via a contact network Advise on relevant and necessary responses [18]
High risk Infection in neighbouring countries/ regions	Update risk assessment in discussion with OEP and neighbouring countries/regions	Implement appropriate processes of contingency plans	Convene OEP Update risk assessment Exchange risk assessment with neighbouring countries/regions	OEP to consider need for enhanced surveillance	Ensure preparedness of epidemiological investigation teams and wider contingency planning isues in the event of an outbreak	Update media tool kit and explanatory materials [44] Brief appropriate media on relevant issues Implement media strategy	Review and update contact network Brief appropriate stakeholders via a contact network Advise on relevant and necessary responses [18]
Immediate risk Active infection in a country affecting either wild birds or poultry	Update risk assessment in discussion with OEP and neighbouring countries/regions Undertake formal reporting to OIE as appropriate	Implement appropriate processes of contingency plans	Convene OEP Use expert advice to guide epidemiological invests Use expert advice to guide local responses at Infected Premise(s) Use expert advice	OEP to consider need for enhanced surveillance especially around infected premises and including potential bridge species	Undertake epidemiological investigations around Infected Premise(s) involving appropriate expertise Communicate epidemiological findings with linked countries/regions	Update media tool kit and explanatory materials [44] Undertake regular briefings of appropriate media on relevant issues Implement media strategy	Review and update contact network Undertake regular briefings of appropriate stakeholders via contact network Advise on relevant and necessary responses [18]

	Risk assessment	**Contingency planning**	**Expert advice & integration within government**	**Surveillance & early-warning (wild birds)**	**Epidemiological investigations (response & reporting)**	**Communication (CEPA) & media issues**	**Other stakeholders including relevant statutory bodies**
			to determine surveillance needs		Publish results including negative results		
Post infection (following an incursion of HPAI)	Review and update risk assessment procedures in light of lessons learnt	Review and update contingency plans in light of lessons learnt	Review and update OEP procedures in light of lessons learnt [e.g. 39]	Review list of potentially higher risk species and areas Review and update surveillance strategy in light of lessons learnt	Review and update epidemiological investigation strategy in light of lessons learnt	Review and update media strategy in light of lessons learnt	Review and update communication arrangements in light of lessons learnt

CROSS-CUTTING ISSUES

	Risk assessment	**Contingency planning**	**Expert advice & integration within government**	**Surveillance & early-warning (wild birds)**	**Epidemiological investigations (response & reporting)**	**Communication (CEPA) & media issues**	**Other stakeholders including relevant statutory bodies**
Capacity development	Develop information tools to assist decision making	Ensure capacity development in addressed is contingency planning	Develop information tools to assist decision making	Determine capacity dev needs and address shortcomings	Ensure adequate capacity to undertake investigations	Training of spokespeople	

2.3 A directory of good practice guidance concerning highly pathogenic avian influenza H5N1 of Asian lineage

This directory aims to provide an introduction to the increasingly large number of technical and other guidances that have been produced in recent years related to issues arising from the spread of HPAI H5N1 since 2003.

It provides hyperlinks to publications that are accessible via the internet, and has also attempted to categorise such guidance with respect to its intended audience, its technical level (*i.e.* accessibility to various groups within society), as well as by language. The current listing is heavily dominated by publications in the English language. It is hoped that future versions of this listing will contain better representation of publications in other languages. Contracting Parties and others are encouraged to submit further examples of good practice guidance to the co-ordinator of the Scientific Task Force on Avian Influenza and Wild Birds (contact details in Appendix 2) so that this listing can be continue to be updated.

Important note: the Ramsar Convention does not necessarily endorse any of the content of the external web-links listed here. These are given solely in the context of their possible utility to Contracting Parties and others.

Levels of intelligibility are roughly assessed as follows:

Public	Content accessible to untrained public
General	Content accessible to informed public, other stakeholder groups and interested parties, as well as trained professionals
Technical	Language and content aimed largely at professionals or technical specialists in the subject area concerned

		Audience	Level	Languages
	Contingency planning and risk assessment			
	General			
1	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).	Scientific/policy	Technical	English only
2	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).	Policy/scientific	Technical	English only
2a	Updated list of species known to have been infected with HPAI H5N1 maintained by USGS	Scientific	Technical	English only

		Audience	Level	Languages
	National Wildlife Health Center			
3	National web-sites of EU Member States dealing with H5N1	Public/ policy; poultry sector	General	Various languages of the European Union
4	*Manual on the preparation of national animal disease emergency preparedness plans*. FAO (1999).	Veterinary professionals and national policy makers	Technical	?
5	National contingency and avian/human pandemic influenza preparedness plans. Web-links to 35 national plans compiled by FAO.	Professional and policy	General	Various languages of the European Union
6	Wildlife trade and global disease emergence. (Karesh.*et al.* 2005).	Scientific/ policy	General	English only
6a	Ramsar Handbook 11: Inventory, assessment and monitoring (3rd edition)	Managers of protected areas	Technical/ General	English, French, Spanish
	Poultry holdings			
7	*Preparing for Highly Pathogenic Avian Influenza: a manual for countries at risk*. FAO & OIE (2006).	Veterinary professionals, poultry sector and policy makers	General	English only
8	*Avian Influenza Incursion Analysis (through wild birds).* British Trust for Ornithology Research Report No. 448. (2006) (12.2 MB file)	Scientific (ornithological) and policy makers	Technical	English only
	Nature reserves and wild birds			
9	*Urgent preliminary assessment of ornithological data relevant to the spread of Avian Influenza in Europe*. Wetlands International, (2006).	Scientific (ornithological) and policy makers	Technical	English only

		Audience	Level	Languages
9a	*Ornithological data relevant to the spread of Avian Influenza in Europe (phase 2): further identification and first field assessment of Higher Risk Species*. Wetlands International, (2007). Add hotlink when on DG Environment site	Scientific (ornithological) and policy makers	Technical	English only
10	Methodology for rapid assessment of ornithological sites Wetlands International (2006). See also example assessments of example European wetlands.	Scientific (ornithological) and policy makers	Technical	English only
11	*Guidelines for Reducing Avian Influenza Risks at Wetland Protected Areas of International Importance for Migratory Waterbirds*. Annex 2 of this document.	Managers of nature reserves and protected areas, and policy makers with responsibility for such areas	General	English French Spanish
12	Ramsar Convention Resolution IX.23 on Highly pathogenic avian influenza and its consequences for wetland and waterbird conservation and wise use (November 2005).	Ramsar Administrative Authorities and other national policy makers	Formal	English, French, Spanish
13	The Ramsar Wetland Risk Assessment Framework. (Adopted by Ramsar Resolution VII.10; 1999).	Managers of nature reserves and protected areas, and policy makers with responsibility for such areas	Technical/ General	English, French, Spanish
14	The Ramsar "Toolkit" 3rd Edition (Ramsar Handbooks for the Wise Use of Wetlands).	Ramsar Administrative Authorities and other national policy makers; managers of protected areas	Technical/ General	English, French, Spanish
14a	Ramsar Handbook 16: Managing wetlands (3rd edition)	Managers of	Technical/	English, French,

		Audience	Level	Languages
		protected areas	General	Spanish
	Zoos and collections			
15	Advice from the British and Irish Association of Zoos and Aquariums on avian influenza.	Managers of zoos and other wildlife collections	General	English only
15	BIAZA guidelines on vaccinating birds against Avian Influenza. British and Irish Association of Zoos and Aquariums (September 2006).	Veterinary professionals responsible for zoos and other animal collections	Technical	English only
16	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).	Managers of public spaces; policy makers and public	General	English only
	Responding to avian influenza infection			
17	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. [DATE?]	Veterinary para-professionals and others in the poultry health sector	General	English, French, Indonesian, Kyrgyz, Laoatian, Russian, Spanish, Vietnamese
18	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).	Policy makers	General	English only?
19	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).			English only
20	Avian Influenza: Protecting Poultry Workers at Risk. US Safety and Health Information Bulletin. U.S. Department of Labor, Occupational Safety and Health Administration (2004).			English only

		Audience	Level	Languages
21	Sims, L.D. 2007. Lessons learned from Asian H5N1 outbreak control. *Avian Diseases* 50: 174-181. Abstract at: hyperlink	Scientific/policy	Technical	English only
	Surveillance and early warning systems			
	The process of undertaking surveillance for avian influenza			
22	EU Guidelines for AI surveillance in wild birds and poultry in 2007. European Commission, DG SANCO (2007).	Scientific (ornithological), veterinary professionals and national agricultural policy makers	Technical	[All EU languages]
23	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). Includes: Recommended ornithological information to be collected during surveillance programmes for the field assessment of mortality events in wild birds [pp. xx-yy].	Scientific (ornithological), veterinary professionals and national agricultural policy makers	Technical	[All EU languages]
24	*Guiding Principles for Highly Pathogenic Avian Influenza Surveillance and Diagnostic Networks in Asia*. FAO (2004).	Veterinary professionals, scientific (ornithological) and national agricultural policy makers	Technical	English only?
25	*Wild Bird HPAI Surveillance: sample collection from healthy, sick and dead birds*. FAO (2006).	Scientific (ornithological), veterinary professionals	Technical	English, **French [GIVE LINK]**
25a	Wild birds and avian influenza: an introduction to applied field research and disease sampling techniques. **[GIVE LINK]** FAO. 2007. FAO Animal Production and Health Manual No. 5. Rome. (Also available at www.fao.org/avianflu)	Scientific (ornithological), veterinary professionals	Technical	English

		Audience	Level	Languages
26	Emergency assistance for early detection and prevention of Avian Influenza; Terms of Reference for Participants in Field Sampling Missions. Wetlands International internal guidance (2006). [Available from Wetlands International]	Scientific (ornithological)	General	English only
	Results of avian influenza surveillance			
27	Wild birds and Avian Influenza in Africa: summary of surveillance and monitoring programmes. Wetlands International, CIRAD & FAO.	Scientific (ornithological)	General	English [French also?]
28	Global Avian Influenza Network for Surveillance (GAINS)	Scientific (ornithological)	General	English only?
29	Results of EU avian influenza surveillance. European Commission, DG SANCO. [Web-site presenting quarterly published results of EU AI surveillance and a range of other relevant publications and materials]	Scientific/policy	Technical	[All EU languages]
30	EU Animal Disease Notification System. European Commission, DG SANCO.	Scientific/policy	Technical	[All EU languages]
	Health and safety guidance			
31	Diseases from birds, with particular reference to Avian Influenza. UK guidance to bird ringers; British Trust for Ornithology (March 2006).	Bird ringers	General	English only
32	Working with highly pathogenic avian influenza virus. UK Health and Safety Executive guidance.	?	Public	English only
33	Risk assessment: avian influenza in public parks/parkland & open waters due to wild bird exposure. [check link broken] UK Health Protection Agency/Department for Environment Food and Rural Affairs (2006).	Managers of public spaces; policy makers and public	General	English only
33a	Links to several guidelines for hunters are given in the US Fish & Wildlife Service website on AI in wild birds at http://www.fws.gov/migratorybirds/issues/AvianFlu/WBAvianFlu.htm	Wildlife hunters	General	Mainly in English only
33b	Joint position statement on avian influenza of CIC-International Council for Game and Wildlife Conservation and FACE Federation of Associations for Hunting and Conservation of the EU	Wildlife hunters	General	English only
	Epidemiology: tracing sources of infection			
34	Epidemiology of H5N1 Avian Influenza in Asia and implications for regional control. Report to FAO (April 2005). [Historical background and major review of events from January 2003 –	Scientific/policy, especially the	Technical	?English only?

		Audience	Level	Languages
	11 February 2005]	veterinary sector		
35	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]	Policy makers/ scientific (ornithological)	Genera;	English only
36	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).	Scientific (ornithological), veterinary professionals and national agricultural policy makers	Technical	[All EU languages]
37	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 (OEP) in a structured epidemiological investigation. UK Department for Environment Food and Rural Affairs (2007). [The OEP is one model of integrated provision of specialist ornithological advice to government policy makers]	Scientific, policy, public	General	English only
	Communication, education and public awareness			
38	IUCN Species Survival Commission Media Guide	Those responsible for media briefings	General	English only
38a	Ramsar Handbook 4: Communication, education and public awareness (3rd edition)	Managers of protected areas, and those responsible for media briefings	Technical/ General	English, French, Spanish
39	Science and Development Network: Dealing with the media	Those responsible for media briefings	General	English only
40	Green Guide to effective PR	Those responsible for media briefings	General	English only
41	Civicus Toolkit on handling the media	Those responsible for media briefings	General	English only
42	AIWEb media pages	Those responsible	General	English only

		Audience	Level	Languages
		for media briefings		
43	Avian influenza and wild birds. Leaflet produced by Scientific Task Force on Avian Influenza and Wild Birds	Those responsible for briefing the media, public, policy makers	General	English, French, Spanish, Chinese, Russian, Arabic
	Organisational websites			
44	Avian Influenza, Wildlife and the Environment Web (Scientific Task Force on Avian Influenza and Wild Birds)			English
45	Birdlife International Avian Influenza webpage			English
46	US Centres for Disease Control and Prevention Avian Influenza facts			English
47	International Council for Game and Wildlife Conservation (CIC) Avian Influenza webpage			English
48	Convention on Migratory Species Avian Influenza webpage			English
48a	Avian Influenza, wildlife and hunting in Europe			English, French, German, Italian, Spanish
49	Wild Bird Global Avian Influenza Network for Surveillance (GAINS)			English
50	World Organisation for Animal Health (OIE)			English French Spanish
51	UN Environment Programme Avian Influenza webpage			English
52	UN Food and Agriculture Organisation (FAO) Avian Influenza webpage			English
53	US Fish & Wildlife Service website on avian influenza in wild birds			English
54	US Geological Service Science Centre Avian Influenza: frequently asked questions			English
55	US Geological Service National Wildlife Health Center			English
56	US Geological Service Patuxent Wildlife Research Center			English

		Audience	Level	Languages
57	Wildlife Conservation Society Avian Influenza webpage			English
58	Wetlands International Avian Influenza webpage			English
59	World Health Organisation Avian Influenza webpage			English
	Formal positions of multi-lateral environmental agreements			
60	Ramsar Convention Resolution IX.23 on Highly pathogenic avian influenza and its consequences for wetland and waterbird conservation and wise use (November 2005)	Ramsar Administrative Authorities and other national policy makers	Formal	English, French, Spanish
61	UNEP/CMS Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) Resolution 3.18 on Avian Influenza (October 2005)			English,
62	UNEP/CBD/COP/8/INF/47 Report of the meeting on the impact of avian influenza on wildlife (March 2006) http://www.biodiv.org/meetings/CoP8mop3/CoP-08.shtml			English
63	UNEP/CMS Resolution 8.27 on Migratory species and highly pathogenic avian influenza (November 2005)			English, French, Spanish

3 GUIDELINES FOR REDUCING AVIAN INFLUENZA RISKS AT MANAGED WETLANDS

3.1 Summary

These guidelines have been produced in response to a request from Ramsar Contracting Parties at CoP 9 for guidance on practical measures to reduce risks of highly pathogenic avian influenza (HPAI) for managers of protected wetland areas the following guidelines have been produced[1].

They are intended to reduce the potential risk of outbreaks of the disease at wetlands of international importance for waterbirds by proposing a range of measures that can be taken before any outbreaks have occurred.

Most of these measures should be systematically planned on the basis of a risk assessment for the site, and within the context of site management plans and outbreak response plans (see Table guidance in section 2).

The guidelines draw to a large extent on existing material and links to sources are provided throughout.

Section 3.3 on risk assessment follows the Ramsar Convention's Wetland Risk Assessment Framework (Ramsar CoP 9 Doc.24, www.ramsar.org and Ramsar Handbook 11 on inventory, assessment and monitoring – Ramsar Secretariat 2007a). The application of this framework to assess the risks of HPAI occurrence at a site (i.e. a specific animal health problem) may have some shortcomings, but the general approach of problem identification, impact prediction, estimation of the extent of impacts, and overall assessment of the risk of adverse impacts, leading to risk management and reduction measures and monitoring and communication with all stakeholders, is recommended as good practice.

Section 3.4 on risk reduction (or management) measures describes how managers of wetlands and other protected areas establish systematic measures to reduce the overall risks of HPAI transmission, based on common principles. As the situation at each site will be different, specific risk reduction measures should be undertaken at each site so that local efforts can be focused on controlling the most significant risk factors. This section lists a range of measures that can be incorporated in site management plans to ensure a systematic and pre-emptive approach towards managing HPAI risks at sites.

Section 3.5 covers surveillance programmes, focusing on their application at sites. These are essential for better understanding the disease, monitoring its development and contributing to early warning systems. They should incorporate the results of risk assessments that have identified those species likely to be at higher risk of carrying the HPAI H5N1 virus, as well as the best strategic design (including optimal selection of sampling sites) and methods of sampling these species. This requires action at many scales, including more effort at national and site levels to monitor the health of wild birds.

[1] These guidelines were been produced under the framework of the UNEP/GEF Siberian Crane Wetlands Project (SCWP), in response to international concern over the threat that HPAI H5N1 poses to waterbird populations, including globally threatened species such as the Siberian Crane *Grus leucogeranus*. This project aims to develop networks of well managed wetland protected areas to support migratory waterbird populations in East and West/Central Asia in cooperation with other flyway conservation initiatives and to address specific threats at selected key sites.

Section 3.6 deals with outbreak response planning - reducing the risks of significant impacts in the case of an HPAI outbreak, primarily through ensuring that procedures are in place for a rapid response. It lists specific questions for site managers to consider when preparing an outbreak response plan and a format for ornithological information to support response needs.

It is worth noting that although these guidelines are aimed at reducing risks and impact of HPAI, they provide a framework for managing other emerging or re-emerging diseases at wetlands, particularly infectious processes.

3.2 Introduction

The guidelines are intended to reduce the potential for outbreaks of HPAI H5N1 of Asian lineage at wetlands managed for waterbirds through a range of measures that can be taken by site managers before any outbreaks have occurred. Most of these measures should be systematically planned on the basis of a risk assessment for the site, and within the context of site management plans and outbreak response plans. A holistic and participatory approach to the risk assessment and plans is advocated here in order to improve their effectiveness.

The purpose of these guidelines is to provide the managers of wetland protected areas with a series of relatively simple procedures and actions that will effectively reduce the risks of avian influenza virus transmission between wild birds, domestic birds and people.

The guidelines have been kept concise and relatively simple to facilitate their use in the widely varied circumstances of wetland protected areas worldwide. More detailed information can be obtained through the websites and references listed in Section 2.3. Most international organizations concerned with avian influenza and wild birds can be contacted through these websites.

The outbreak and spread of the HPAI H5N1 in recent years has led to widespread concern, in terms of its potential impacts on human health (especially the risk of a global pandemic), the poultry industry, and the conservation of wild birds. These guidelines focus on the last aspect, and are based on the available literature on HPAI H5N1 and the recommendations of international conservation conventions, FAO, OIE, WHO as well as selected national sources (see also Section 2). The Scientific Task Force on Avian Influenza and Wild Birds (Appendix 2) in particular, has coordinated international scientific advice on the conservation impact of avian influenza.

While there are numerous sources of information and advice on the HPAI H5N1, few of these relate to the management of natural areas for wild birds. Recent work for the European Union (Wetlands International & EURING 2006; Veen *et al.* 2007) suggested species which were hypothesised to pose a higher potential risk of spreading HPAI H5N1 along their migration routes to the EU. Analyses of migration routes of these so-called 'higher risk' species on the basis of ringing recoveries, identified wetland sites where such species concentrate and developed and tested a format for the rapid assessment of ornithological data at the level of wetland sites (see Section 4).

While this approach has not yet been applied to other regions, it is of particular relevance to these guidelines.

3.2.1 Avian influenza and wild birds

Wild birds, especially shorebirds and waterfowl, are the natural reservoir of low pathogenic influenza (LPAI) viruses. These hosts and their viruses have become well-adapted to each other over time and infection does not usually cause overt disease in wild birds. These low pathogenic viruses replicate mainly in the intestinal tract of aquatic birds and are transmitted in the faeces. Thus, transmission in aquatic birds is by the faecal-oral route i.e. wetland habitats provide the natural source of infection for other individuals.

The HPAI H5N1 virus infecting poultry, other domestic animals, wildlife and humans almost certainly originated from the mutation of a LPAI virus on poultry farms in East Asia. The virus has spread rapidly within and between farms, taking advantage of local practices in the feeding, housing, slaughtering and trade of domestic ducks, chickens and geese. Poor hygiene, overstocking and mixing of different domestic animals greatly increases the risk of spreading the infection. As a result the virus is now considered to be endemic in poultry of east and southeast Asia (Scientific Task Force on Avian Influenza and Wild Birds 2006).

It is likely that there has been repeated 'spill-over' of infection from domestic to wild birds, the disease causing mortality in many species of wild birds including swans, geese, ducks, cormorants, grebes, gulls, herons, egrets and storks, with most reports coming from Europe and Asia.

It is clear that trade in domestic poultry has been a crucial factor in the spread of infection both locally and over long, even cross-continental distances. However, analysis of genetic sequences and other indirect evidence suggest that, in at least some cases, wild migratory birds are likely to have contributed to further spread (see Chen *et al.* 2006 for example). The actual importance of this mechanism, however, is unclear in the present state of knowledge.

Further background information is provided in Appendix 1.

When planning control measures at individual protected areas, it is essential that managers should obtain information on the respective national policies, legislation and administrative arrangements action plans and contingency plans through the related authorities for human health, animal health and the environment in their countries.

3.3 Risk assessment

3.3.1 Introduction

The rapid emergence of HPAI H5N1, its high level of pathogenicity for poultry and some wild bird species, and its transmission to humans in close contact with poultry have together resulted in a major global response.

However, many aspects which may be important in of the spread of this subtype of avian influenza virus are poorly understood, including its epidemiology in wild birds and other wildlife, its persistence in the environment, the exact migratory routes used by many bird species, the trade routes used for poultry and poultry products and the extent of its spread by both the legal and illegal trade in wild birds. At the site level, often little quantitative information is available on the assemblage of bird species present in any particular month of the year, their use of neighbouring areas, and the dynamics of local wetland ecosystems.

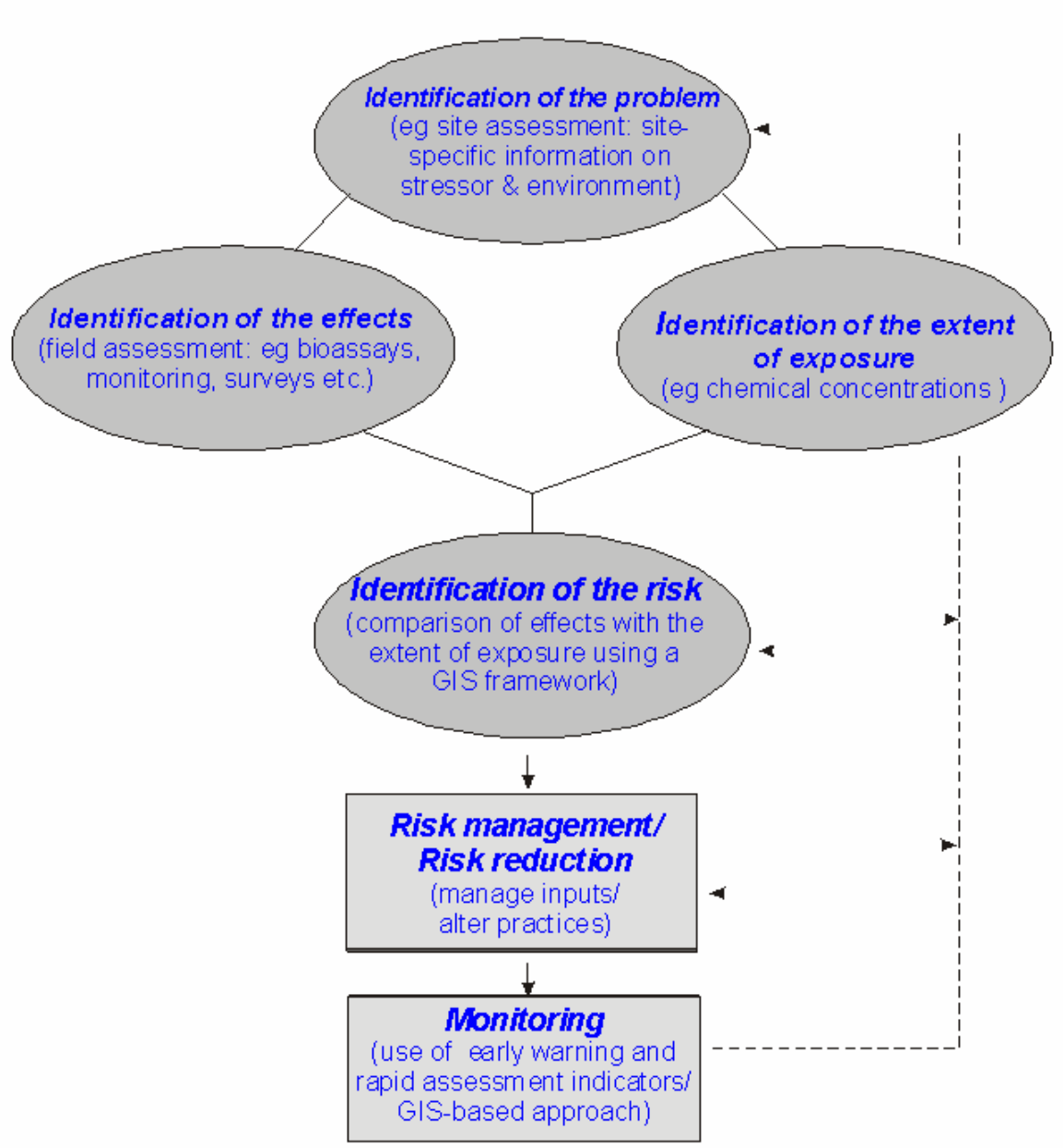
UNEP (2006) recommends that all countries should undertake risk assessments which should be transparent, structured, science-based and make use of all available knowledge. In the face of all

this uncertainty, the development of accurate risk assessments for both countries and individual wetland sites is problematic. This reflects the need to give priority to applied research, monitoring and surveillance so that risk assessments and related management actions can be more targeted and accurate. UNEP (2006) provides recommendations on data, information and research needs, emphasizing the importance of enhanced field surveillance efforts.

However, it is important to make efforts using the best available information to reduce risks at wetland protected areas, starting with a site risk assessment.

The Ramsar Convention's Wetland Risk Assessment Framework (Ramsar CoP 9 DOC.24; Ramsar Convention Secretariat 2007a) provides a mechanism for predicting and assessing change in the ecological character of wetlands, and promotes the usefulness of early warning systems. This framework is outlined in Figure 3.1 and explained further in Ramsar's *Handbook on Inventory, Assessment and Monitoring* (Ramsar Convention Secretariat 2007a). The application of this framework to assess the risks of HPAI occurrence at a site (i.e. a specific animal health problem) may have some shortcomings, but the general approach of problem identification, impact prediction, estimation of the extent of impacts, and overall assessment of the risk of adverse impacts, leading to risk management and reduction measures and monitoring, can still be recommended as good practice.

Figure 3.1. Model for wetland risk assessment (see Ramsar Convention Secretariat 2007a).



Step 1 - Problem identification

This step involves recognizing the nature of HPAI H5N1 pathogenicity, means of transmission, etc. While much about the virus and epidemiology of the disease remains unknown, some key points are summarized below (see Appendix 1 for more details):

1. HPAI H5N1 has infected a wide range of bird and some domestic and wild mammal species.
2. The virus has shown high virulence in poultry and infected birds have usually died quickly. However, there is some evidence that experimentally infected ducks can survive while shedding virus (e.g. Chen *et al.* 2006; Hulse-Post *et al.* 2005);
3. Cross-infection can occur between domestic / captive birds and wild birds (in both directions) although actual transmission mechanisms are largely undocumented.

4. Some species are thought to be at a higher risk of infection than others due to their behavioural and ecological characteristics (Wetlands International & EURING 2006; Veen *et al.* 2007).
5. Although information is still lacking, there is likely to be great variability in the survival of virus in the environment, especially in faecal and other organic material, with temperature, pH, salinity and UV radiation all affecting viral viability.

It is therefore important to gather information on ecological aspects of, and human activities within, a site to ensure that the problems can be subsequently both quantified and qualified.

Step 2 – Identification of the adverse effects

Timing of possible outbreaks

The potential adverse effects will depend largely on which bird species are present at the site at different times of the year (residents, breeding visitors, non-breeding (winter) visitors, passage migrants and nomadic or irruptive species). The seasonal timing of an outbreak will significantly affect the risks to bird populations owing to the varying presence of different species.

Bird distribution on site

Bird species occupy different parts of the site according to habitat preferences and daily behavioural patterns (feeding, roosting, bathing/drinking). Most bird species are more sedentary during the breeding season, remaining within breeding territories.

Some species will be present in dense flocks, some in loose dispersed flocks, and others as small groups or individuals. Most species will mix with other species at a site during the course of their stay.

Some bird and mammal species will remain far from human habitation while others are attracted as it offers benefits such as food sources, shelter, nesting and safety from predators. These species, such as sparrows, starlings, crows, pigeons, rats and mice have the potential to carry disease between industrial or domestic poultry and wild birds, and are known as "bridge species" (see Highly Pathogenic Avian Influenza Infection Route Elucidation Team 2004; Veen *et al.* 2007).

Presence of species of high conservation importance

The presence of globally threatened species, more than 1% of a biogeographic waterbird population, or more than 20,000 waterbirds are among the criteria which determine the international importance of a wetland for waterbirds. Important Bird Area criteria include the presence of restricted range and endemic species. Consideration of species of high conservation importance should be a priority during risk assessments, with the aim of reducing the level of risks to such species.

It should be noted that HPAI H5N1 has also infected several mammal species, with scavengers and predators of dead birds likely to be most at risk (see Appendix 1).

Step 3 – Identification of the likely extent of the problem

Prediction of the extent of HPAI outbreaks at a site is difficult, in view of the scarcity of information about outbreaks in wild birds elsewhere. Points for site managers to consider are:

- If the outbreak occurs in poultry, the biosecurity of the facility, early diagnosis of the disease, and the speed of response in controlling the outbreak and preventing its further spread are all of critical importance.
- If poultry and their wastes are kept in biosecure facilities away from the wetlands, the risks of cross-infection to wild birds should be much reduced.
- The virus can survive in water and spread through wetlands. Waste from poultry facilities should not be allowed to enter wetlands, and water supplies for poultry facilities should come from clean sources.
- Outbreaks in wild birds appear to have been largely self limiting *e.g.* Jungle Crows *Corvus macrorhynchos* in Japan in 2004 (see Highly Pathogenic Avian Influenza Infection Route Elucidation Team, 2004), but recorded mortality has been high in some situations *e.g.* at Qinghai Lake, China in May 2005.
- Some species appear to be more vulnerable to infection, such as swans, ducks and grebes.
- Wild birds often move outside the wetland's boundaries to other areas in the surrounding landscape. For instance geese, ducks, swans and cranes may feed on agricultural fields and use the wetland for roosting. Fish-eating birds like cormorants may commute between wetlands, rivers, fishponds and coastal areas. In such cases, wider assessments of the risk of cross-infection and spread are thus needed.

Step 4 – Identification of the risk

This involves integrating the results from the assessment of likely effects (Step 2) with those from the assessment of the likely extent of the problem (Step 3). A range of techniques exist for estimating risks, often depending on the type and quality of likely effects and their extent. Mapping of the assessments using GIS can be used to link the effects to impacts (e.g. poultry facilities on site, other human activities, distribution of key species at the site across different seasons, seasonal changes in water levels leading to concentrations of wild bird species or wild and domestic birds, important roost sites (either temporary or permanent), wetland margins and crop patterns in adjacent landscapes).

This may indicate that the risks caused by an outbreak are higher during the peak migration and non-breeding period for some sites; or the opposite for other sites which have, for example, breeding waterbird populations in summer and are frozen during the winter.

Also, the risks posed by infection at sites containing high concentrations of birds (e.g. dense flocks of swans, geese, ducks and cranes) may be relatively high if there are significant infection routes (perhaps bridge species, presence of captive birds, or feeding stations).

3.4 Risk reduction measures

3.4.1 Principles

Wetland site managers can implement a series of measures that should effectively reduce the risks of HPAI transmission between wild birds, domestic birds and people at their sites. As the situation at each site will be different, risk reduction measures should be undertaken at the scale of individual sites so that local efforts can be focused on controlling the most significant risk factors.

However, managers of individual sites and protected area systems can also put in place systematic measures which should reduce the overall risks of HPAI transmission across all sites. The general principles of these measures are to:

1. physically separate wild birds and domestic/captive birds (including poultry);
2. improve bio-security arrangements for domestic/captive birds;
3. control environmental transmission routes for the virus on the site e.g. via wild, captive or domestic birds and fomites (inanimate contaminated objects such as footwear or vehicle wheels);
4. improve surveillance of the health of domestic/captive birds and wild birds;
5. improve the knowledge base on the use of the site by wild birds and potential bridge species in particular; and
6. be fully prepared with a response plan in the event of an outbreak (see outbreak response planning).

There is wide international consensus that attempting to control HPAI through responses such as culling or disturbing wild birds, or destroying wetland habitats is not feasible and should not be attempted, not least since it may exacerbate the problem by causing further dispersion of infected birds. Resolution IX.23 of the Ramsar Convention on Wetlands states the "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". These conclusions were also highlighted by the Convention on Migratory Species (CMS) Resolution 8.27 and the African-Eurasian Waterbird Agreement (AEWA) Resolution 3.18.

3.4.2 Management planning

Wetland protected areas are most effectively managed on the basis of site management plans (see the Ramsar's Handbook 16 on Managing Wetlands; Ramsar Convention Secretariat 2007b). These provide a systematic approach to the maintenance of conservation values, sustainable use of natural resources, and other land uses including research, education and economic activities. Management plans provide a basis for controlling land-uses and other activities within protected areas when supported by legislation and regulations, and when there is a strong relationship between the management authorities and local stakeholders (e.g. through participatory management approaches and environmental education programmes). Management plans still provide a systematic means of implementing policies and initiatives if these enabling conditions are less than ideal.

Local measures related to reducing HPAI risks will usually be related to **site management objectives** concerning the following subjects:

1. conservation of waterbird populations;
2. conservation of threatened or endemic bird species;
3. captive breeding/reintroduction of wild bird species on site;
4. agricultural practices within the protected area;
5. sustainable use of natural resources (including hunting);
6. human access to different parts of the site;

7. communication, education and public awareness programmes; and
8. stakeholder participation and inter-agency communications.

A. Conservation of waterbird populations

The main concern for reserve management will be to maintain the value of the site for waterbird populations, although the details will vary by site e.g. breeding, staging and/or over-wintering birds. Reserve management needs to have reliable information on the distribution of these birds across the site and surrounding areas in different seasons, supported by an ongoing monitoring programme.

In many cases the parts of the sites used by these birds will be distant from human activities due to factors such as habitat distribution, protection regimes and disturbance. However, situations can occur when wild birds will inevitably come into close proximity with people and their activities, as follows:

i. small or linear sites surrounded by dense human populations (e.g. coastlines and rivers near cities, lakes near urban centres);
ii. small sites located in intensive agricultural landscapes or densely populated rural areas;
iii. sites where feeding of wild birds occurs, either by site managers or the public;
iv. sites where domestic/captive birds are present on the wetlands or around their margins;
v. sites where wild birds feed on agricultural land inside or around a protected area; or
vi. large sites that include human settlements and are used for natural resource exploitation (fishing, hunting, collection of other wetland products, grazing, etc.).

In risk situations, measures should generally aim to minimize contact between wild bird populations and domestic/captive birds (including poultry), as well as people, although this may be difficult to achieve in some situations. Some practical steps that can be taken are as follows:

i. zoning of land uses to separate human activities (like poultry farms, domestic poultry) from wild bird populations;
ii. regulations for management zones to require improved biosecurity measures such as – keeping all poultry indoors or in fenced enclosures either year round or at times of higher risk; proper disposal of waste from poultry (avoiding waterways and agricultural land used by wild birds); constraining movements of free-flying or feral birds; no use of live decoy birds for hunting/trapping; no releases of birds for hunting activities; reducing human and vehicular access, etc.;
iii. to reduce risk of onward spread of infection and reduce human health risks in the case of actual outbreaks at the site or in its surroundings, restrict human access to parts of the site where contact with wild bird populations is minimal. This can be done through management zones, controls on vehicle access, fencing, etc. (see UK Health Protection Agency 2006 for example);
iv. prohibit public feeding of wild birds in the case of HPAI outbreaks;
v. consider alternatives to feeding of wild birds by reserve management in order to avoid over-concentration of wild birds and related disease transmission risks; and
vi. promote public education to raise awareness of HPAI, the risks it poses, and some simple precautions and response actions.

B. Conservation of threatened bird species

Generally the same measures as for migratory waterbird populations should be undertaken, although any restrictions on access and activities would be for those parts of the site used by the threatened species. Effective conservation measures will require detailed information on the distribution of these species at the site (including those areas used for feeding, bathing, roosting, and nesting, and seasonal changes in these), supported by monitoring programmes.

C. Captive breeding / re-introduction of wild bird species on site

"Disease is increasingly recognized as a significant risk factor in conservation programs involving animal movements such as reintroduction or translocation. Disease risk poses threats not only to the species on which programs are focused but also to other species that share the habitat. The concern over disease processes and their impact extends across diverse areas of interest including the fields of conservation biology, wild and zoo conservation management and veterinary medicine as well as to agricultural medicine and human medical fields. However disease risk has proven to be complex and difficult to assess and quantify in the context of a conservation program. The growing recognition that disease issues can profoundly affect the viability of populations and consequently the success or failure of conservation programs has led to diverse efforts by individuals and groups to develop some rational means to:

i. assess the risks that disease poses to these programs;

ii. develop well reasoned understandings of the factors and issues involved and

iii. make reasonable decisions based on these assessments." (Armstrong *et al.* 2003).

Some wetland protected areas maintain small collections of captive wild birds, for public education and display, research, captive breeding and release programmes to bolster wild populations of rare and endangered species. In general, such collections of captive birds should not be allowed to mix with wild birds – they should be kept in aviaries and not allowed to roam freely around the site. Preventing wild birds such as sparrows, starlings, pigeons, crows and gulls from entering enclosures is difficult unless they are completely enclosed with roof-netting and sheltered feeders are provided. See Section 2 for examples of guidelines.

In addition, water and waste from captive bird collections should not be allowed to enter natural wetlands in order to reduce virus transmission. This will be difficult to achieve in some sites with established collections without the construction of water management structures or water treatment facilities.

Birds to be released from the captive breeding facility as part of reintroduction programmes should undergo thorough pre-release health screening as recommended by IUCN's Reintroduction Specialist Group (IUCN, 1998).

There are many existing guidelines on good healthcare and biosecurity for poultry and captive birds – see Section 2 for examples including FAO guidelines on avian influenza and keeping small scale poultry (in different languages).

Captive bird populations should be kept under surveillance for HPAI and other infectious diseases, and sick birds quickly quarantined from other birds.

It is worth emphasizing that under unusual circumstances such as crowding, HPAI H5N1 could be devastating. The crowding of birds can be regarded as a pervasive threat, with HPAI H5N1 as just one example among many infectious diseases that could lead to significant mortality.

In view of the significant risks posed by a potential outbreak of HPAI H5N1, collections of high conservation value species (such as globally endangered cranes and waterbirds) should have good biosecurity arrangements in place and managers should consider dispersion to separate cage facilities or sites to reduce risks. Where appropriate, consideration should be given to vaccination of captive birds with the aim of reducing mortality and potential viral shedding.

Wildlife rehabilitation facilities should also be reviewed for biosecurity, and preferably kept separate from captive bird collections to reduce risks of introducing disease.

D. Agricultural practices within the protected area

There are a number of agricultural practices which have the potential to increase the risks of HPAI infection on site. These are:

i. intensive poultry farming (chickens, turkeys, quail, ducks and geese);

ii. domestic poultry rearing (generally small scale for subsistence) and rearing exotic birds (pigeons, pheasants, ornamental waterbirds, etc.);

iii. draining of waste water and poultry wastes into drains that are connected to wetlands;

iv. spreading organic manure from poultry farms as fertilizer on farmland; and

v. using fish-food that includes poultry manure as an ingredient for aquaculture.

In general, intensive poultry rearing is not a suitable activity for a wetland protected area that is important for waterbirds and this should be reflected in the regulations for the related management zones. This may become a cause of conflict where intensive farms already exist, and often wetlands are considered suitable environments for free-range duck farming. In such cases, the options include:

i. improving the biosecurity of the farm as far as possible so that there is no connection with wild birds or the wetland system;

ii. relocating the farm to another place with no connection to the wetland system; or

iii. closing the farm down and compensating the owners.

Small scale poultry rearing is harder to control (FAO biosecurity guidelines listed in Annex 1), but in general birds should be kept indoors or in an enclosure at certain times throughout the year and off the wetland system. If the risk is considered to be high, the activity could be banned in certain management zones within a wetland protected area.

Manure from intensive poultry farms is commonly used as a fertilizer on agricultural land. It is recommended that this practice should be banned completely within wetland protected areas in order to reduce disease risks. The option of controlled usage in specified areas (e.g. away from wetlands) can be considered, but attention should be paid to spillage along access routes, drainage off fields into the wetlands, and use of fertilized fields by wild birds. In these situations, pre-treatment for poultry manure through heat or sun-drying that inactivates viruses is recommended.

It is strongly recommended that any fish-food used on-site for aquaculture should not include poultry manure or other poultry by-products as an ingredient. Alternative foods are available.

E. Sustainable use of natural resources (including hunting)

The main risks involved through the use of natural resources relate to bringing people into close contact with wild waterbird populations, placing people theoretically at risk of HPAI infection from wild birds. Given the apparently low prevalence of HPAI H5N1 in wild bird populations, this risk is very low where no recorded outbreak has occurred and no specific control measures are considered necessary.

Public access to parts of the site can provide the benefit of improved reporting of unusual occurrences of sick or dead birds, especially if public education is conducted.

General guidance should be provided to the public not to handle dead or sick wild birds and to report any such incidents to a specified authority immediately. More detailed guidance is available from a number of sources listed in Section 2.3.

Hunters (including waterbird trappers) are at a slightly higher risk because they handle freshly killed or live wild birds. Guidelines for hunters are available on a number of websites (Section 2.3). Guidance generally encourages good hygiene practices such as washing hands after handling killed birds; and not eating, drinking or smoking until hands have been washed and ensuring that shot birds are cooked properly.

In the event of a reported HPAI outbreak at or near a site, it is recommended that management authorities contact hunting representatives and immediately stop hunting and trapping of wild birds at the site until further notice. Continued shooting may cause infected birds to disperse as a result of disturbance, and places hunters at increased risk of infection from handling killed birds and therefore should be stopped.

The use of live decoy birds should be prohibited at high risk sites. For European Union Member States, Decision 2005/734/EC elaborates on conditions where the use of live decoys may be allowed, including individual numbered bands on decoy birds and biosecurity measures for their upkeep (European Commission 2007).

F. Human access to different parts of the site

At times of low risk i.e. when there have not been reports of HPAI in the region, there is no reason to impose additional controls on human access. At times of increased risk e.g. when HPAI has been reported in the region, restrictions should then be considered. Management zoning for wetland protected areas should seek to create zones where important feeding and roosting concentrations of migratory waterbirds, breeding colonies, and rare and endangered species are not disturbed by human presence. Regular human disturbance effectively reduces the extent of suitable habitat and increases the stress on individual birds through reduced feeding opportunities and increased energy expenditure and may lead to increased disease susceptibility. Certain activities such as hunting, jet-skis and speedboats create more disturbance, for example, than walking or cycling.

General guidance should be provided to the public not to handle dead or sick wild birds and to report any incidents of unusually large mortality to a specified authority immediately.

Guidance for individuals involved in handling wild birds for research, banding, disease surveillance and other purposes is available from different sources listed in Section 2.

At times with presumed low risk in the absence of known HPAI outbreaks, the guidance is similar to that for hunters i.e. an emphasis on good hygiene practices such as washing hands after handling birds; and not eating, drinking or smoking until hands have been washed.

G. Communications, education and public awareness programmes

Public education is an important proactive measure that site managers can take in order to ensure that local stakeholders are informed with sound balanced factual information about HPAI, the risks it poses, and the measures that they can take to protect themselves. It should also indicate how they can contribute towards reducing HPAI risks at the site, and provide clear information about the communication lines in case of an outbreak.

It is suggested that the main target groups for HPAI awareness programmes are members of any existing site management committee (such as local government agencies, community leaders, hunting and trapping associations, NGOs), local residents and users of the wetlands, and schools. Local health and veterinary services should always be involved.

Communication needs to be tailored for the local situation and kept simple (see Alders & Bagnol 2006 and other guidance sources in Section 2).

Simple information leaflets or posters in local languages are among the most effective ways of reaching a wide range of people around the site.

Reporting of dead or sick birds by the public and others should be encouraged as part of surveillance programmes (see Section 3.5) and procedures for simple reporting systems communicated widely.

H. Stakeholder participation and inter-agency communications

Wetland site managers need to appreciate the wide range of agencies that may be involved in an HPAI outbreak response, from human and animal health professionals, to local government, law enforcement professionals and environmental authorities. Indeed, one of the major challenges posed by HPAI is the need for efficient inter-agency coordination between these stakeholders. The formation of national committees including all relevant organisations has been found valuable by several Contracting Parties and is recommended good practice (see also Section 5). This also needs to include coordination at a local level.

These co-ordination mechanisms should be agreed and set out in an outbreak response plan (see below). The outbreak response plan should be shared with all key stakeholders so that it can be followed correctly. All contingency and communications plans need to be formulated, and relationships developed, in 'peacetime' i.e. prior to increased risk of disease. The running of scenario-based exercises will help to ensure that plans are fit for purpose.

Site management plans provide a practical framework for establishing measures to minimize HPAI risks on a site specific basis. These should be discussed and agreed with stakeholders so that they can be implemented efficiently, with local co-operation and support. It is recommended that public education measures be undertaken first, so that the stakeholders

understand the risks involved and how they can contribute towards the collective security of the site.

3.5 Surveillance

Comprehensive surveillance programmes are essential for better understanding the disease, monitoring its development and contributing to early warning systems. They should incorporate the results of risk assessments that have identified those species likely to be at higher risk of carrying HPAI H5N1, as well as the best strategic design (including optimal timing of surveillance and selection of sampling sites) and methods of sampling these species. This requires action at many levels, including more effort at national and site levels to monitor the health of wild birds. Interest groups, such as hunters and birdwatchers, can play a vital role in the monitoring and reporting of dead birds or unusual mortality, provided their members are trained to minimise risks of self-infection and spread of the disease.

Significant efforts have already been made to try to understand the role of wild birds as vectors of HPAI H5N1, as well as the actual and potential impact of the virus on wild populations of conservation concern. Several countries have initiated or reinforced surveillance programmes aimed at determining the presence and extent of the virus in wild bird populations.

In 2005, a Global Avian Influenza Network for Surveillance (GAINS) was established with the aims to build capacity for field operations for collection of samples from wild birds, improve the understanding of virus strains and transmission of influenza viruses in wild birds, and to disseminate information to all levels of governments, international organizations, the private sector and the general public. See www.gains.org for details.

Surveillance should:

i. be undertaken with clearly set objectives;

ii. be conducted with standardised protocols in line with national and international programme requirements including appropriate consideration for health and safety, and legal aspects, and in co-operation with relevant local and national authorities;

iii. should strive to always identify birds to species level and report these data (see guidance in Section 4), where possible including broader contextual epidemiological data e.g. age, sex and proportion of population affected.

iv. consider monitoring methods that are both active (sampling live or shot birds, or active targeted dead bird surveillance) and passive (wider sampling of birds found dead);

v. establish sampling methods that follow recognized standard protocols (e.g. major FAO guidance documents listed in Section 2.3);

vi. involve, as appropriate, public reporting of unusual wild bird mortality. Contact numbers and procedures for reporting dead birds should be widely publicised.

3.6 Outbreak response planning

The final and crucial step concerns reducing the risks of significant impacts in the case of an HPAI outbreak, primarily through ensuring that procedures are in place for a rapid response. Outbreaks of HPAI H5N1 among wild birds typically occur unexpectedly, confronting site managers with an emergency situation, which demands immediate action. Managers, together

with local and national authorities will have to take decisions with respect to restricting human use of the site, monitoring bird mortality and possibly sampling to assess presence and extent of infection.

Specific questions for site managers to consider when preparing an outbreak response plan include:

- What are the existing national, provincial and local regulations, plans or guidelines for HPAI outbreaks?
- Who are the responsible human health, animal health and environmental protection authorities? Contingency plans should provide contact details (such as mobile phone numbers) so that rapid contact can be made with key individuals.
- What equipment needs to be kept on site to respond to an HPAI outbreak? Personal protective equipment, cleansing and disinfection equipment, storage facilities for samples, etc
- If dead or sick birds are found, what procedures should be followed in order to confirm the cause of death?
- Who needs to be informed at a local level? Contact details should be gathered in advance.
- At what stage should control measures be put in place?
- How will the public be informed and when? Is there a standard message that can be prepared in advance and used in the event of an outbreak?
- How will the media be dealt with? Is there a standard message that can be prepared in advance and used in the event of an outbreak?
- What controls on access to the site are required? How will these be implemented?
- How can the local spread of the disease be quickly contained?
- What measures are needed to protect reserve staff and their families, or others, living on site?
- Who are the local ornithological and related experts who can assist rapid response measures in the case of an outbreak? Contact details should be gathered in advance.
- Where can the necessary information on bird distribution, movements and other related information such as existing HPAI surveillance data, be accessed?

As for formation of stakeholder groups and communication strategies, full outbreak response plans need to be formulated in 'peacetime' i.e. before risk of HPAI outbreaks. Moreover these plans need to be tested by scenario-based exercises. Such exercises involving all stakeholders will improve preparedness by both fine-tuning plans and providing staff training.

Any outbreak of HPAI H5N1 in a wetland site in domestic/captive or wild birds will also lead to a series of questions, which necessitate quick answers. Such questions include:

- How many birds are affected and which species are involved? What proportion of the population does this constitute?

- Are there 'higher risk' species[2] present and in what numbers?
- Are there concentrations of roosting/nesting birds that use the site?
- Is there a special risk for transmission of the virus to poultry in the neighbourhood and if so, which species can be expected to be involved?
- Are there endangered species present which might need special attention and/or protection?
- Are there any neighbouring sites to which the virus might spread because they are commonly used by the same birds?
- What is the position of the site in the flyways of migratory waterbirds and can any prediction be made with respect to spread of the disease at a larger geographical scale?
- What is the timing of migration for higher risk species occurring at the site?

In order to find answers to these questions it is necessary to quickly locate and analyse ornithological data that might be managed by different organizations and/or individual ornithologists.

A draft Rapid Assessment Format for ornithological data in case of an outbreak of HPAI H5N1 is given by Wetlands International & EURING (2006). Its aim is to give guidance to site owners and site managers to help them prepare for an outbreak of HPAI H5N1 in their wetland area. Since wetland sites vary greatly with respect to size, habitat characteristics, avifauna, human use and other aspects, the format provided is of a very general nature. Its main purpose is to guide and stimulate site managers to seriously consider possible future events, to prepare for an outbreak of HPAI H5N1, and to develop a strategy in anticipation of the possible spread of the disease to their site.

The draft Assessment Format was tested at four sites in Europe and west Africa. The format lists the following site-related information and attributes which are considered to be fundamental in preparing for an HPAI H5N1 outbreak:

1. General information on the site (location, size, ownership);
2. Short description of the general and ecological characteristics of the site (accessibility, habitat characteristics, human use);
3. The occurrence of vulnerable bird species (status, numbers and seasonal presence of higher risk species, species with a high "contact risk with poultry" and endangered species);
4. Places with high concentrations of vulnerable bird species within the site;
5. Local movements of vulnerable bird species to neighbouring sites;
6. Position of site in flyway and consequences of bird movements for further spread of Avian Influenza virus H5N1;
7. Human use of the site and any disturbance effects;
8. The existence of poultry farms within a radius of 10 km of the site (although it should be noted that many species of birds have far greater daily ranges than this);
9. Measures to be considered in case of an outbreak; and

[2] To date, only identified within Europe (Wetlands International & EURING 2006; Veen *et al.* 2007).

10. Data sources.

3.7 References

Alders, R.G. & Bagnol, B. 2007. Effective communication: the key to efficient HPAI prevention and control. *World's Poultry Science Journal* 63: 139-147.

Armstrong, D., Jakob-Hoff, R. & Seal, U.S. (eds.) 2003. *Animal movements and disease risk.* Fifth ed. CBSG, Apple Valley, Minnesota, USA.

Chen, H., Smith, G.J.D., Li, K.S., Wang, J., Fan, X.H., Rayner, J.M., Vijaykrishna, D., Zhang, J.X., Zhang, L.J., Guo, C.T., Cheung, C.L., Xu, K.M., Duan, L., Huang, K., Qin, K., Leung, Y.H.C., Wu, W.L., Lu, H.R., Chen, Y., Xia, N.S., Naipospos, T.S.P., Yuen, K.Y., Hassan, S.S., Bahri, S., Nguyen, T.D., Webster, R.G., Peiris, J.S.M. & Guan, Y. 2006. Establishment of multiple sublineages of H5N1 influenza virus in Asia: implications for pandemic control. *Proceedings of the National Academy of Science* 103: 2845-2850.

European Commission 2007. : Commission Decision of 19 October 2005 laying down biosecurity measures to reduce the risk of transmission of highly pathogenic avian influenza caused by Influenza virus A subtype H5N1 from birds living in the wild to poultry and other captive birds and providing for an early detection system in areas at particular risk. Decision 2005/734/EC.

Hulse-Post, D.J, Sturm-Ramirez, K.M., Humberd, J., Seiler, P., Govorkova, E.A., Krauss, S., Scholtissek, C., Puthavathana, P., Buranathai, C., Nguyen, T.D., Long, H.T., Naipospos, T.S.P., Chen, H., Ellis, T.M., Guan, Y., Peiris, J.S.M. & Webster, R.G. 2005. Role of domestic ducks in the propagation and biological evolution of highly pathogenic H5N1 influenza viruses in Asia. *Proceedings of the National Academy of Sciences* 102: 10682-10687.

Highly Pathogenic Avian Influenza Infection Route Elucidation Team 2004. Routes of Infection of Highly Pathogenic Avian Influenza in Japan. Highly Pathogenic Avian Influenza Infection Route Elucidation Team, Food Safety and Consumer Bureau, Ministry of Agriculture , Forestry & Fisheries Tokyo, Japan.

IUCN (1998). Guidelines for reintroductions. Prepared by IUCN/SSC Reintroduction Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. 10pp.

Ramsar Convention Secretariat 2007a. *Inventory, assessment, and monitoring: An Integrated Framework for wetland inventory, assessment, and monitoring*. Ramsar handbook for the wise use of wetlands, 3rd edition, Vol. 11. Ramsar Convention Secretariat, Gland, Switzerland. 49 pp.

Ramsar Convention Secretariat 2007b. Managing wetlands: Frameworks for managing Wetlands of International Importance and other wetland sites. Ramsar handbook for the wise use of wetlands, 3rd edition, Vol. 16. Ramsar Convention Secretariat, Gland, Switzerland. 93 pp.

Scientific Task Force on Avian Influenza and Wild Birds 2006. *Avian Influenza and Wild Birds. What is their actual role in the spread of the virus?* CMS Secretariat, Bonn, Germany.

UNEP 2006. *Conclusions and Recommendations of the Scientific Seminar on Avian Influenza, the Environment and Migratory Birds. 10-11 April 2006*. UNEP DEWA, CMS & AEWA, Nairobi. 9 pp.

UK Health Protection Agency/Department for Environment Food and Rural Affairs 2006. Risk assessment: avian influenza in public parks/parkland & open waters due to wild bird exposure. [CHECK STILL AVAILABLE – LINK SEEMS BROKEN]

Veen, J., Brouwer, J., Atkinson, P., Bilgin, C., Blew, J., Eksiog lu, S., Hoffmann, M., Nardelli, R., Spina, F., Tendi, C. & Delany, S. 2007. *Ornithological data relevant to the spread of Avian Influenza in Europe (phase 2): further identification and first field assessment of Higher Risk Species.* Wetlands International, Wageningen, The Netherlands. [ADD LINK WHEN UP ON DG-ENV WEB-SITE]

Wetlands International & EURING 2006. *Urgent preliminary assessment of ornithological data relevant to the spread of Avian Influenza in Europe*. Report commissioned by European Union (EU) Directorate General for the Environment. 230 pp.

4 RECOMMENDED ORNITHOLOGICAL INFORMATION TO BE COLLECTED DURING SURVEILLANCE PROGRAMMES OR FIELD ASSESSMENT OF WILD BIRD MORTALITY EVENTS, ESPECIALLY AT WETLANDS

4.1 Recommended information to be collected

a. 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 reported[3]. Age[4] and sex should be recorded wherever possible.

b. 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, for example, via EURING[5]). Recording individual ring numbers[6] in the reporting spreadsheet provides a means of accessing these data for future analysis.

c. To provide an audit of identification, it is highly desirable that a clear digital photograph[7] 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.

d. 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:

    i. 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;

    ii. record of the numbers of each species of other live birds in the sampling area that were not sampled;

---

3 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.

4 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).

5 www.EURING.org

6 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*.

7 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.

iii. if available, records of bird movements (arrivals/departures) which occurred at the sampling site prior to the sampling;

iv. 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

v. 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.

4.2 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 photographs[8] 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 taken[9]; 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.

---

8 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.

9 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*).

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.

5 ORNITHOLOGICAL EXPERT PANELS

Several Contracting Parties have found it valuable to establish advisory panels involving best available ornithological expertise as a means of responding to the call in Resolution IX.23 to integrate ornithological expertise within government disease response processes. Such panels can provide specialist advice to veterinarians, epidemiologists and others in response to outbreaks. The following guidance is based on these experiences.

Whether or not a separate panel is established, or alternatively that ornithological expertise is instead integrated within other governmental processes, will depend on the nature of existing organisational structures. This should be determined nationally. However, ideally any Ornithological Expert Panel (OEP) should be part of the epidemiological team that has the responsibility to investigate HPAI outbreaks as such integration greatly assists in the identification of achievable scientific objectives.

Table 2.1 lists further sources of information and guidance as to how expert specialist advice can be integrated within government responses.

5.1 Composition

Ornithological Expert Panels should comprise best available ornithological expertise drawn from both governmental and non-governmental sectors, including – as relevant – ornithological experts from research institutes or universities. Staff from national bird ringing centres and national or other relevant waterbird monitoring schemes, where these exist, should be involved so as to facilitate rapid analysis of data and information drawn from relevant databases and other information sources

5.2 Establishment

OEPs or other advisory bodies should be established in advance of disease outbreaks as part of forward national contingency planning. There is value to all involved in explicitly establishing the formal relationship between OEP (or similar) within other government disease response processes and structures.

5.3 Scale and federal states

The scale at which advice is sought will depend on how government is structured. If animal disease responses are co-ordinated within federal states at sub-national scales, then typically, specialist ornithological advice should be available to decision-makers at that scale.

5.4 Mode of working

In order to facilitate the rapid convening of advisory expertise, contingency planning should plan means of bringing together relevant experts at short notice so as to provide advice to decision makers immediately after confirmation of infection outbreaks. Where possible, the experts should be made aware and kept up to date on the epidemiological features of any outbreak involving domestic poultry and the progress of the epidemiological investigations. It should be anticipated that experts will be scattered, and thus may not be able physically to assemble, thus necessitating the use of teleconferencing or other similar arrangements which should be planned for.

5.5 Emergency ornithological field assessments

In order to assist epidemiological investigation, and to help better to reduce risk of disease spread, contingency planning should address the need for emergency field assessments so as to establish the nature of, and collect information on, populations of wild birds near an outbreak site. These field assessments are usually driven by outbreak specific objectives, but can include local wild bird movements and the degree of access to domestic poultry. Ornithological advice on additional and specific surveillance is frequently sought following these assessments. One possible format for such evaluations is provided by Wetlands International (2006).

Field assessments should be complemented by desk based rapid ornithological data assessments which seek to interrogate available data sources and thus to inform risk assessments. Even if available data in birds near outbreaks may be limited, it will always assist decision-making to systematically collate relevant information.

5.6 International networking

It is very valuable to be able to share risk assessments, and ornithological data and evaluations between neighbouring countries (or within wider geographic regions). To this end, national OEPs should collaborate together at regional scales to develop collective international assessments and understanding.

5.7 Lessons learnt

Following the activation of the OEP in the event of an outbreak, it is essential afterwards to then undertake a formal 'lessons learnt' review, to identify any problems or areas of operation where there may be scope for improvement of activity. The outcome of such a review should then be implemented by modifying contingency arrangements (and/or formal Terms of Reference).

5.8 References

Wetlands International 2006. *Urgent preliminary assessment of ornithological data relevant to the spread of Avian Influenza in Europe*. Wetlands International report to DG-Environment, European Commission. 230 pp.

6 APPENDICES

Appendix 1. Scientific summary of highly pathogenic avian influenza H5N1 of Asian lineage: wildlife and conservation considerations

Definition of avian influenza

Avian influenza is a contagious disease caused by influenza A viruses, affecting many species of birds. Avian influenza is classified according to disease severity into two recognized forms: low pathogenic avian influenza (LPAI) and highly pathogenic avian influenza (HPAI). LPAI viruses are generally of low virulence, while HPAI viruses are highly virulent and result in nearly 100% mortality in infected domestic flocks (CIDRAP 2007). The natural reservoir of LPAI viruses is in wild waterbirds – most commonly in ducks, geese, swans, waders and gulls (Hinshaw & Webster 1982; Webster *et al.* 1992; Stallknecht & Brown 2007).

To date, influenza A viruses representing 16 hemagglutinin (HA) and 9 neuraminidase (NA) subtypes have been described in wild birds and poultry throughout the world (Rohm *et al.* 1996; Fouchier *et al.* 2005). Viruses belonging to the antigenic subtypes H5 and H7, in contrast to viruses possessing other HA subtypes, may become highly pathogenic when transmitted from wild birds to poultry (Senne *et al.* 1996).

Notifiable avian influenza is defined by the World Organization for Animal Health (OIE) as "an infection of poultry caused by any influenza A virus of the H5 or H7 subtypes or by any avian influenza virus with an intravenous pathogenicity index (IVPI) greater than 1.2 (or as an alternative at least 75% mortality)" (OIE 2004).

Genesis of highly pathogenic avian influenza viruses

In wild waterbirds, LPAI viruses are a natural part of the ecosystem. They have been isolated from over 90 species of wild bird, and are thought to have existed alongside wild birds for millennia in balanced systems. In their natural hosts, avian influenza viruses generally do not cause disease; instead, the viruses remain in evolutionary stasis as indicated by low genetic mutation rates (Gorman *et al.* 1992, Taubenberger *et al.* 2005). When LPAI viruses are transmitted to vulnerable poultry species, only mild symptoms such as a transient decline in egg production or reduction in weight gain (Capua & Mutinelli 2001) are induced. However, where a dense poultry environment supports several cycles of infection, the viruses may mutate, adapting to their new hosts, and for the H5 and H7 subtypes these mutations can lead to generation of a highly pathogenic form. Thus, HPAI viruses are essentially products of intensively farmed poultry (GRAIN 2006; Greger 2006). They should be viewed as something artificial, made possible by human modification of a naturally balanced system.

After an HPAI virus has arisen in poultry, it has the potential both to re-infect wild birds and to cause disease in other non-avian taxa, with different subtypes showing varying predilection for horses, pigs, humans, mustelids, felids, and even seals and cetacea. If influenza A viruses adapt inside these new hosts to become highly transmissible, there can be devastating consequences, such as the human influenza pandemics of the 20th century (Kilbourne 2006). The conditions necessary for cross-infection are provided by agricultural practices that bring together humans, poultry and other species in high densities in areas where there is also the potential for viral transmission from wild birds to domestic ducks on shared wetlands and in 'wet' (*i.e.* live animal) markets (Shortridge 1977; Shortridge *et al.* 1977).

Highly pathogenic avian influenza H5N1 of Asian lineage (HPAI H5N1)

HPAI H5N1 of Asian lineage has infected domestic, captive and wild birds in more than 60 countries in Africa, Asia and Europe. By November 2005, over 200 million domestic birds had died from disease or been slaughtered in attempts to control its spread; the economies of the worst affected countries in southeast Asia have suffered greatly, with lost revenue estimated at over $10 billion (Diouf 2005), and there have been serious human health consequences. By February 2008, the World Health Organisation (WHO) had confirmed more than [350] human cases, [over 60%] of those fatal.

Sporadic deaths in wild birds have been reported since 2002 and the first outbreak involving a large number of wild birds was reported in May 2005, in Qinghai province, China (Chen ; Lui). Between 2002 and the present, the virus has infected a variety of wild bird species (Gilsdorf 2006; Lee unpublished; Olsen 2006; USGS 2008), but which species are important in H5N1 HPAI movement and whether the virus will become enzootic in wild bird populations is still unknown (Brown *et al.* 2006).

The virus has also infected a limited number of domestic, captive and wild mammals, including captive Tigers *Panthera tigris* and Leopards *Pathera pardus* and domestic pigs in southeast Asia, and domestic cats and a wild Stone Marten *Martes foina* in Germany. These cases were the result of 'spillover' infection from birds. There is no known reservoir of HPAI H5N1 virus in mammals and no current evidence that the virus can be readily transmitted from mammal to mammal.

Emergence of HPAI H5N1 in poultry in southeast Asia (1996 – 2005)

HPAI H5N1 first received widespread recognition following a 1997 outbreak in poultry in Hong Kong SAR with subsequent spread of the virus to humans. During that outbreak, 18 human cases were recognized and six patients died. The outbreak ended when all domestic chickens held by wholesale facilities and vendors in Hong Kong were slaughtered (Snacken 1999). A precursor to the 1997 H5N1 strain was identified in Guangdong, China, where it caused deaths in domestic geese in 1996 (Webster 2006).

Between 1997 and 2002, different reassortments (known as genotypes) of the virus emerged, in domestic goose and duck populations, that contained the same H5 HA gene but had different internal genes (Guan *et al.* 2002; Webster 2006).

In 2002, a single genotype emerged in Hong Kong SAR and killed captive and wild wildfowl in nature parks there. This genotype spread to humans in Hong Kong in February 2002 (infecting two, killing one) and was the precursor to the Z genotype that later became dominant (Sturm-Ramirez *et al.* 2004; Ellis *et al.* 2004).

Between 2003 and 2005, the Z genotype spread in an unprecedented fashion across southeast Asia, affecting domestic poultry in Vietnam, Thailand, Indonesia, Cambodia, Laos, Korea, Japan, China and Malaysia. Later analysis showed that the H5N1 viruses that caused outbreaks in Japan and Korea were genetically different from those in other countries (the V genotype) (Mase *et al.* 2005; Li *et al.* 2004; Webster *et al.* 2006).

In April 2005, the first major outbreak in wild birds was reported. Some 6345 wild birds were reported dead at Qinghai Lake in central China. Species affected were Great Black-headed Gull

Larus ichthyaetus, Bar-headed Goose *Anser indicus*, Brown-headed Gull *Larus brunnicephalus*, Great Cormorant *Phalacrocorax carbo* and Ruddy Shelduck *Tadorna ferruginea*.

Geographical spread of HPAI H5N1 out of southeast Asia (2005 – 2006)

In July 2005, Russia reported its first outbreaks; domestic flocks were affected in six regions of western Siberia and dead wild birds were reported in the vicinities of these outbreaks. Kazakhstan reported its first outbreak in August 2005 in domestic birds. In the same month, 89 wild birds described as migratory species were reported infected at two lakes in Mongolia.

Europe reported its first outbreaks in October 2005 when infection was detected in domestic birds in Romania and Turkey. In the same month, Romania reported sporadic cases in wild birds as did Croatia and European parts of Russia. In November, the virus spread to domestic birds in Croatia and the Ukraine, and the Middle East reported its first case: a flamingo kept as a captive bird in Kuwait. During December, two outbreaks were reported in European Russia in wild swans (species unreported) in regions near the Caspian Sea.

In the first half of 2006, the spread of HPAI H5N1 continued across Europe (Sabirovic *et al.* 2006; Hesterberg *et al.* 2007) and the Middle East and into Africa. Between January and May, infection was reported in 24 European countries with the majority of cases occurring in February and March in wild birds. During the same period, outbreaks were reported across central Asia and the Middle East, affecting domestic birds in Azerbaijan, India, Bangladesh, Pakistan, Iran and Iraq, with Azerbaijan also reporting infected wild birds. The first reported outbreak in Africa occurred in January in poultry in Nigeria, and by the end of April, seven other African nations[10] had reported outbreaks.

By May 2006, outbreaks in Europe, the Middle East and Africa had for the most part decreased in frequency. Small numbers of cases of infection were reported in Hungary, Spain and the Ukraine in June; Pakistan and Russia in July; and one case was identified in a captive swan in Germany in August. Egypt was exceptional, continuously reporting outbreaks throughout 2006. It is also considered likely that outbreaks continued in poultry in Nigeria.

Throughout the time HPAI H5N1 was spreading across central Asia, Europe, the Middle East and Africa, it maintained a stronghold in poultry in southeast Asia. In 2006, outbreaks were reported in Cambodia, China, Hong Kong, Indonesia, Korea, Laos, Malaysia, Myanmar, Thailand and Vietnam.

Outbreaks of HPAI H5N1 since 2006 and the current situation

Compared with 54 countries reporting 1,470 outbreaks to the OIE in 2006, 30 countries reported 638 outbreaks in 2007. In Europe, eight countries reported sporadic and relatively isolated outbreaks in poultry that were quickly controlled; infected wild birds were reported in Germany, France, United Kingdom and the Czech Republic; and birds at a rehabilitation centre were affected in Poland. In the Middle East and central Asia, poultry outbreaks occurred throughout 2007 in Egypt and Bangladesh with over 350 outbreaks reported to the OIE from these two countries alone. Poultry (and in some countries captive birds) were also affected in India, Kuwait, Saudi Arabia, Pakistan, Afghanistan and Israel with most outbreaks occurring between February and April, and again between October and December. In Africa, HPAI H5N1 was reported in domestic birds in Togo, Ghana and Benin; and is considered to have become

[10] List countries if possible

enzootic in Nigeria. Again, as in 2006, poultry outbreaks continued across southeast Asia. Sporadic cases in wild birds were reported in Japan and Hong Kong.

At present, in January 2008, a small number of wild bird cases are being detected in the United Kingdom; large numbers of poultry outbreaks are occurring in India and parts of southeast Asia; and the virus is considered to be enzootic in poultry in Egypt, Indonesia and Nigeria; and possibly enzootic in Bangladesh and China.

Major outbreaks of HPAI H5N1 in wild birds

Prior to HPAI H5N1, reports of HPAI in wild birds were very rare. The broad geographical scale and extent of the disease in wild birds is both extraordinary and unprecedented. The following table (Table 7.1) summarises the known major outbreaks of HPAI H5N1 in wild birds.

Table 7.1. Major outbreaks of highly pathogenic avian influenza H5N1 in wild birds*

Year	Month(s)	Location(s)	Description of affected birds
2005	April	Qinghai Lake in central China	6345 waterbirds, the majority of which were Great Black-headed Gulls, Bar-headed Geese and Brown-headed Gulls
	August	Lake Erhel & Lake Khunt in Mongolia	89 waterbirds including ducks, geese and swans
	October – November	Romania & Croatia	Over 180 waterbirds, mainly swans
2006	January	Coastal area in the vicinity of Baku, Azerbaijan	Unspecified number of birds reported to the OIE as "various migratory birds"
	January – May	23 countries in Europe including Turkey and European Russia	The majority of cases occurred in ducks, geese and swans but a wide variety of species were infected including other waterbirds & raptors
	February	Rasht, Iran	153 wild swans
	May	Multiple locations in Qinghai province, China	Over 900, mainly waterbirds, the majority of which were Bar-headed Geese
	May	Naqu, Tibet	Over 2300 birds – species composition unclear but 300 infected Bar-headed Geese were reported
	June	Lake Hunt in Bulgan, Mongolia	12 waterbirds including swans, geese and gulls
2007	June	Germany, France and the Czech Republic	Over 290, mainly waterbirds, found mostly in Germany

* Data sources include OIE disease information reports and the German Friedrich-Loeffler Institute epidemiological bulletins – dates, locations and numbers may differ slightly in other sources.

Are wild birds involved in the spread of HPAI H5N1?

Numerous species of wild birds, especially waterbirds, are susceptible to infection by the HPAI H5N1 virus. Close contact between wild birds and poultry can lead to cross-infection, from poultry to wild birds and from wild birds to poultry. The loss of wetlands around the globe may force many wild birds onto alternative sites like farm ponds and paddy fields, bringing them into

direct contact with chickens, ducks, geese, and other domestic fowl. Additionally, species that live in and around poultry farms and human habitations may serve as "bridge species" that could potentially transmit the virus between poultry and wild birds. Genetic analysis and other indirect evidence suggests that in at least some cases wild migratory birds are likely to have contributed to spread in some areas. The relative importance of this mechanism, however, is unclear in the present state of knowledge. Poor planning in response to development pressures has led to the increasing loss or degradation of wild ecosystems, which are the natural habitats for wild birds. The displaced wild birds increasingly seek to feed and live in areas populated by domestic poultry (and humans). This provides greater opportunities for the spread of HPAI H5N1 between wild and domestic birds, and thence to humans. This issue of "ecohealth" highlights the interplay between agriculture, animal (domestic and wild) health, human health, ecosystem health, and socio-cultural factors. However, it is unlikely that wild birds play a major role in spreading avian influenza (Kilpatrick *et al.* 2006; Gauthier-Clerc *et al.* 2007). The total number of wild birds affected has so far been small and although billions of wild birds cross continents regularly during their migrations they do not seem to have a significant impact on spreading the virus on a large scale.

Wildlife conservation implications

Prior to HPAI H5N1, reports of HPAI in wild birds were very rare. The broad geographical scale and extent of the disease in wild birds is both extraordinary and unprecedented, and the conservation impacts of HPAI H5N1 have been significant.

It is estimated that between 5-10% of the world population of Bar-headed Goose *Anser indicus* died at Lake Qinghai, China in spring 2005. At least two globally threatened species have been affected: Black-necked Crane *Grus nigricollis* in China and Red-breasted Goose *Branta ruficollis* in Greece. Approximately 90% of the world population of Red-breasted Goose is confined to just five roost sites in Romania and Bulgaria, countries that have both reported outbreaks, as also have Russia and Ukraine where they also over-winter.

However, the total number of wild birds affected has been small in contrast to the number of domestic birds affected, and many more wild birds die of commoner avian diseases each year. Perhaps a greater threat than direct mortality is the development of public fear about waterbirds resulting in misguided attempts to control the disease by disturbing or destroying wild birds and their habitats. Such responses are often encouraged by exaggerated or misleading messages in the media.

Avian influenza and wetlands

Given the ecology of the natural hosts of LPAI viruses, it is unsurprising that wetlands play a major role in the natural epidemiology of avian influenza. As with many other viruses, particles survive longer in colder water (Lu *et al.* 2003; Stallknecht *et al.* 1990b), and the virus is strongly suggested to survive over winter in frozen lakes in Arctic and sub-Arctic breeding areas. Thus, as well as the waterbird hosts, these wetlands are probably a permanent reservoir of LPAI virus (Rogers *et al.* 2004; Smith *et al.* 2004) (re-)infecting waterbirds arriving from southerly areas to breed (shown in Siberia by Okazaki *et al.* 2000 and Alaska by Ito *et al.* 1995). Indeed, in some wetlands used as staging grounds by large numbers of migratory ducks, avian influenza viral particles can be readily isolated from lake water (Hinshaw *et al.* 1980).

An agricultural practice that provides ideal conditions for cross-infection and thus genetic change is used on some fish-farms in Asia: battery cages of poultry are placed directly over troughs in

pig-pens, which in turn are positioned over fish farms. The poultry waste feeds the pigs, the pig waste is either eaten by the fish or acts as a fertiliser for aquatic fish food, and the pond water is sometimes recycled as drinking water for the pigs and poultry (Greger 2006). These kinds of agricultural practices afford avian influenza viruses, which are spread via the faecal-oral route, a perfect opportunity to cycle through a mammalian species, accumulating the mutations necessary to adapt to mammalian hosts. Thus, as the use of such practices increases, so does the likelihood that new influenza strains lethal to humans will emerge (Culliton 1990; Greger 2006).

As well as providing conditions for virus mutation and generation, agricultural practices, particularly those used on wetlands, can enhance the ability of a virus to spread. The role of Asian domestic ducks in the epidemiology of HPAI H5N1 has been closely researched and found to be central not only to the genesis of the virus (Hulse-Post *et al.* 2005; Sims *et al.* 2005), but also to its spread and the maintenance of infection in several Asian countries (Shortridge & Melville 2006). Typically this has involved flocks of domestic ducks used for 'cleaning' rice paddies of waste grain and various pests, during which they are exposed to wild ducks using the same wetlands. Detailed research (Gilbert *et al.* 2006; Songserm *et al.* 2006) in Thailand has demonstrated a strong association between the HPAI H5N1 virus and abundance of free-grazing ducks. Gilbert *et al.* (2006) concluded that in Thailand "wetlands used for double-crop rice production, where free-grazing duck feed year round in rice paddies, appear to be a critical factor in HPAI persistence and spread".

References

Gauthier-Clerc, M., Lebarbenchon, C. & F. Thomas, F. 2007. Recent expansion of highly pathogenic avian influenza H5N1: a critical review. *Ibis* doi: 10.1111/j.1474-919x.2007.00699.x

Hesterberg, U., Harris, K., Cook A. & Brown, I. 2007. *Annual Report. Surveillance for avian influenza in wild birds carried out by Member States. February- December 2006*. Community Reference Laboratory for avian influenza and Newcastle disease. 53 pp. http://ec.europa.eu/food/animal/diseases/controlmeasures/avian/annrepres_surv_wb_02-12-2006_en.pdf

Kilpatrick, M., Chmura, A.A., Gibbons, D.W., Fleischer, R.C., Marra, P.P. & Daszak, P. 2006. Predicting the global spread of H5N1 avian influenza. *Proceedings of the National Academy of Sciences* 103(15): 19368–19373. http://www.pnas.org/cgi/reprint/103/51/19368

Sabirovic, M., Wilesmith, J., Hall, S., Coulson, N., Landeg, F. 2006. Situation Analysis – Outbreaks of HPAI H5N1 virus in Europe during 2005/2006 – An overview and commentary. DEFRA, International Animal Health Division, United Kingdom. 40 pp.

Appendix 2. Scientific Task Force on Avian Influenza and Wild Birds

The **Scientific Task Force on Avian Influenza and Wild Birds** was established in 2005 by the UNEP Convention on Migratory Species (CMS), in close cooperation with the Agreement on the Conservation of African Eurasian Migratory Waterbirds (AEWA). It comprises 14 members and observers, including UN bodies, multi-lateral environmental agreements (including the Ramsar Convention) and specialist intergovernmental and non-governmental organizations. Since August 2007 the CMS Secretariat and FAO have provided joint co-ordination for the Task Force.

The Task Force aims to obtain the best scientific advice on the conservation impact of the spread of HPAI H5N1, including assessing the potential role of migratory birds as vectors of the virus. It has issued advice on the root causes of the spread of this disease and has promoted the development of international 'early warning' systems. The Task Force promotes objective information on the role of wild birds as vectors of HPAI H5N1, and tries to avoid overreaction by decision/policy makers that could be detrimental to the conservation of waterbird species and their habitats. The members of the Task Force work through teleconferences, email contact and meetings.

The last Task Force meeting, an international workshop on 'Practical lessons learned'(Aviemore, Scotland, June 2007) concluded that future outbreaks needed to be tackled quickly, involving wild bird experts as well as veterinarians and other specialists. The meeting considered that whilst wild birds are affected by the virus, domestic birds, especially the poultry industry and trade, hold the key to limiting future international spread. Furthermore, there is the continuing need to further develop national inter-ministerial capacities within governments and inter-disciplinary collaborations elsewhere to respond to the challenges posed by HPAI H5N1.

The Task Force also operates a unique web-based platform on Avian Influenza, Wildlife and the Environment (www.aiweb.info), through which information exchange and expert communication on current and emerging topics relating to HPAI H5N1, migratory birds and the environment is facilitated further.

Contacts and further information:

Francisco Rilla
Information Officer

UNEP/CMS Secretariat
UN Campus
Hermann-Ehlers-Str. 10
53113 Bonn, Germany

Tel: +49 228 815 24 60
Fax: +49 228 81524 49
e-mail: frilla@cms.int

Scott Newman
International Wildlife Coordinator for Avian Influenza

UN Food & Agriculture Organisation
Infectious Disease Group/ EMPRES
Viale delle Terme di Caracalla
Rome, Italy 00100

Tel: +39 06 570 53068
Fax: +39 06 570 53023
e-mail: scott.newman@fao.org

Appendix 3: Terminology[11]

Care must be taken when describing and discussing avian influenza to avoid confusion. Avian influenza, avian influenza virus, human influenza, highly pathogenic avian influenza, and H5N1 cannot be used interchangeably. The following table (Table 7.2) lists commonly used avian influenza terms and provides definitions and usage guidelines.

Table 7.2. Definitions and usage guidelines for a selection of terms commonly used when discussing avian influenza.

Term	Acronym	Definition and usage
Avian flu*		Used colloquially and by the media, and often used wrongly, to refer to HPAI in poultry and/or humans – because its use can cause great confusion, it is better to avoid it, even when referring to poultry or other species of birds.
Avian influenza*	AI	A disease of birds caused by an influenza A virus – it is **not** a virus. Only use the term "avian influenza" to refer to the **disease** in poultry or other bird species – and remember that "avian influenza" can refer to either low pathogenic or highly pathogenic forms of the disease (LPAI or HPAI). Infection does not necessarily produce disease.
Avian influenza virus	AIV	The aetiological (causative) agent of avian influenza.
Bird flu*		Used colloquially and by the media, and often used wrongly, to refer to HPAI in poultry and/or humans – because the use of these terms can cause great confusion, it is better to avoid them, even when referring to poultry or other species of birds.
Enzootic/endemic		Prevalent among or presently constantly in a population in a specific geographic area. Endemic refers to human populations, while enzootic refers to populations of animals.
Genotype		Specific genetic composition of a virus, each subtype of AIV will have multiple genotypes. Genotyping AIVs aids epidemiological investigations.
Hemagglutinin	HA	Surface antigen on the influenza virus. Together with the neuraminidase (NA) antigen it defines the antigenic phenotype of the virus, which in turn, classifies influenza A viruses into subtypes.
Highly pathogenic avian influenza	HPAI	A severe disease in poultry and some other birds; has been associated with some H5 and H7 viruses; not all H5 and H7 viruses are highly pathogenic.
Low pathogenic avian influenza	LPAI	See avian influenza.
Neuraminidase	NA	Surface antigen on the influenza virus. Together with the hemagglutinin (HA) antigen it defines the antigenic phenotype of the virus, which in turn, classifies

[11] *Source:* Lubroth, J. & Roeder, P. 2007. *FAO AIDE NEWS. Situation Update* 45: 4-5. Emergency Center for Transboundary Animal Diseases, FAO.

Term	Acronym	Definition and usage
		influenza A viruses into subtypes.
Pathogenic		Causing disease or capable of doing so.
Poultry		Term referring to domestic birds bred for meat, eggs, feathers etc. including chickens, turkeys, ducks, geese, quail etc.
Prevalence		Proportion of individuals within a given population with disease at a given time.
Subtype		A classification of influenza A virus based on the antigenic phenotype, which is determined by the HA and NA antigens present on the virus. Subtype examples include H5N1, H5N2, H7N3, H13N9.
Virulence		Ability of an infectious organism to produce disease (similar to pathogenicity but more a factor of the virus rather than host response).
Waterbird		Species of birds that are ecologically dependent on wetlands for at least part of their annual cycle including e.g. wildfowl, waders, gulls, herons, grebes, auks etc.

* **Never** use the terms "bird flu", "avian flu" or "avian influenza" to refer to human disease, even when it is a question of influenza in humans caused by infection from HPAI – the correct term to use, even though it is lengthy, is "influenza in humans caused by a virus of avian origin".