Workshop Proceedings: Review of wildlife exotic disease preparedness in Australia

Canberra, April 2008

Compiled by Wendy Henderson

Australian Government
Department of Agriculture, Fisheries and Forestry

Invasive Animals Cooperative Research Centre

Workshop Proceedings: Review of wildlife exotic disease preparedness in Australia

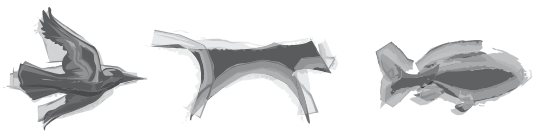
2-3 April 2008
Belconnen Premier Inn, Canberra

Hosted by the Invasive Animals Cooperative Research Centre, with funding from the Wildlife Exotic Disease Preparedness Program (Australian Department of Agriculture, Fisheries & Forestry)

Report compiled by Wendy Henderson

Australian Government

Department of Agriculture, Fisheries and Forestry



Invasive Animals Cooperative Research Centre

Workshop Proceedings — Review of wildlife exotic disease preparedness in Australia.

Report prepared for the Invasive Animals Cooperative Research Centre Detection and Prevention's Project 8.D.2e: Workshop to review Wildlife Exotic Disease Preparedness Program (WEDPP).

Published by: Invasive Animals Cooperative Research Centre.

Postal address: University of Canberra, ACT 2600.

Office Location: University of Canberra, Kirinari Street, Bruce ACT 2617.

Telephone: (02) 6201 2887

Facsimile: (02) 6201 2532

Email: contact@invasiveanimals.com

Internet: http://www.invasiveanimals.com

ISBN: 978-0-9804999-5-7

Web ISBN: 978-0-9804999-6-4

Cover design: Kerryn Molloy, Invasive Animals Cooperative Research Centre.

Cover images (top to bottom): *Angiostrongylus* nematode (Australian Registry Wildlife Health), dead feral pig (Adam Henderson), mouth lesion on deer with foot-and-mouth disease (United States Department of Agriculture), and stained *Mycobacterium* in sheep lung abscess (Australian Registry Wildlife Health).

This document should be cited as: Henderson, W. R. (2008). Workshop Proceedings — Review of wildlife exotic disease preparedness in Australia. 2-3 April 2008, Canberra. Invasive Animals Cooperative Research Centre, Canberra.

Contents

Executive Summary

This report summarises the proceedings of a workshop to review wildlife disease preparedness in Australia. The workshop was organised by the Invasive Animals Cooperative Research Centre (IA CRC), with funding from the Wildlife Exotic Disease Preparedness Program (WEDPP) of the Australian Department of Agriculture, Fisheries and Forestry. It was held over 2–3 April 2008 in Canberra.

The workshop aimed to review:

- recent research related to wildlife disease preparedness, including WEDPP-funded projects
- current status of training manuals (particularly AUSVETPLAN's Wild Animal Response Strategy) and preparedness exercises
- infrastructure of WEDPP.

Representatives from all states attended, from departments of agriculture and environment, universities, the Australian Wildlife Health Network (AWHN), Australian Registry of Wildlife Health, the IA CRC and the Australian Biosecurity CRC. Two representatives from New Zealand's Department of Conservation and Landcare Research also attended.

Priorities identified for research include:

- targeted disease surveillance
- basic wildlife ecology including population distribution and contact rates
- identifying and prioritising diseases of native species
- impacts of climate / land-use change on emerging diseases
- a cross-sectoral approach for managing the ecology of emerging wildlife diseases
- enhanced modelling for contingency planning.

The development of a prioritisation system to identify high-risk diseases and species involved was considered essential to be able to prioritise research and funding.

Priorities for training and preparedness include:

- immediate review and updating of AUSVETPLAN's Wild Animal Response Strategy
- compiling and distributing a list of key personnel
- regular field and desk exercises for preparing for an emergency outbreak
- review of animal welfare guidelines
- review of legislation relevant to wildlife health and disease outbreak (eg legality of poison deployment).

It was agreed that the continuation and expansion of the future-proofing that WEDPP and AWHN provides is important: a structure is needed that supports research, and follows up with evaluation and implementation into policy, training and response strategies. There was no general consensus on how the infrastructure of WEDPP and/or AWHN or a similar body could be improved to sustain an effective wildlife disease preparedness agency. However, the workshop concluded that:

1. Wildlife health is a crucial issue and if ignored there could be serious economic, environmental and social ramifications at a national or international level.

2. Australia should have a national body to ensure wildlife health is kept on the agenda.

3. Australia has the existing structure to deal with wildlife health issues, but it is currently fragile.

4. An agency focussing on wildlife health issues should continue with strong support from federal and state governments, and with significantly increased funding.

A strong national focus on wildlife health will help protect Australia's natural trade advantage, and minimise any potential negative impacts on its human health and biodiversity.

Abbreviations and acronyms

AB CRC	Australian Biosecurity Cooperative Research Centre
ABIN	Australian Biosecurity Intelligence Network
AI	avian influenza
AHC	Animal Health Committee
AHA	Animal Health Australia
AUSVETPLAN	Australian Veterinary Emergency Plan
AWHN	Australian Wildlife Health Network
ARWH	Australian Registry of Wildlife Health
CRC	Cooperative Research Centre
DAFF	Department of Agriculture, Fisheries and Forestry
DEWHA	Department of Environment, Water, Heritage and the Arts
DoHA	Department of Health and Ageing
FMD	foot-and-mouth disease
IA CRC	Invasive Animals Cooperative Research Centre
NAHIS	National Animal Health Information System
NCRIS	National Collaborative Research Infrastructure Strategy
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
OIE	World Organisation for Animal Health
PIMC	Primary Industries Ministerial Council
PISC	Primary Industries Standing Committee
SMEAC	situation, mission, execution, administration, control/ communication
Tb	tuberculosis
VPC	Vertebrate Pests Committee
WARS	Wild Animal Response Strategy
WEDPP	Wildlife Exotic Disease Preparedness Program
WNV	West Nile virus

1. Introduction

The Wildlife Exotic Disease Preparedness Program (WEDPP) is a joint program between the Australian Government's Department of Agriculture, Fisheries and Forestry (DAFF) and state/territory governments. It was established in 1984 to develop survey and control techniques for feral pigs in an exotic animal disease emergency. The program has since broadened its scope to cover research on a range of native and exotic animals, including epidemiological studies, assessments of control techniques, workshops, pest animal surveys, and development of diagnostic tools. Recently, the focus has been on improving wildlife surveillance, particularly of feral pigs and wild birds (the latter mainly for avian influenza). This workshop was held primarily to review the role of WEDPP in wildlife disease preparedness in Australia, and provide recommendations for future directions.

1.1 Introductory remarks

(Chris Bunn, Wildlife Exotic Disease Preparedness Program)

Wildlife diseases often are the cause of breakdown with major diseases of livestock. In 2000 France declared itself free of bovine tuberculosis; in 2001 France detected tuberculosis in deer and in 2008 this disease is still present. In February 2008, the United States declared that all states are now free of bovine brucellosis, but in the same media release they stated the presence of brucellosis in free-ranging bison and elk in Yellowstone National Park and Grand Teton National Park still threatens the brucellosis status of surrounding states.

Many issues about wildlife and disease are gaining prominence. For example, there is no government agency or international organisation that focuses on the numerous diseases that threaten people, domestic animals and wildlife alike. Diseases such as avian influenza, severe acute respiratory syndrome (SARS), Nipah and Hendra are recent emerging diseases with a major wildlife component.

A recent government initiative is AusBIOSEC[1]. The aim is to build on specific industry- and pest- based strategies, legislation and operational procedures already in place for primary industries, and draw on these to establish arrangements for the environment sector.

WEDPP currently aims to improve Australia's exotic disease preparedness through the development of strategies to prevent, control or eradicate exotic disease in wildlife and feral animals. WEDPP has been reviewed and modified over the years to better adjust to changing circumstances and the completion of tasks, such as the production of an emergency manual. However, the years 2009–2010 are seen as a time of change.

From this workshop we need to address the macro considerations — the future direction and priorities of WEDPP, and the micro considerations — where the gaps are and what the priorities for future projects are.

1 See http://www.daff.gov.au/animal-plant-health/pests-diseases-weeds/biosecurity/ausbiosec

1.2 Aims

The aims of the workshop were to review the current status of research and management infrastructure related to wildlife disease preparedness, and to provide recommendations to WEDPP, regarding future:

- research priorities (field and desktop)
- training requirements and activities
- infrastructure / management options for improved efficiency.

1.3 Methodology

The workshop was organised by the Invasive Animals Cooperative Research Centre (IA CRC), with funding from WEDPP. It was held in Canberra on 2-3 April, 2008. WEDPP management considered a review of the program to be timely, given the time elapsed since its last review, the current development of AusBIOSEC and the government's commissioned review of Australian biosecurity and quarantine procedures[2]. The workshop also addresses the IA CRC's goal of 'Reduced risk of disease transfer from invasive animals to livestock and wildlife.' It addresses the specific milestone of 'Current information related to animal diseases collated, published and disseminated'.

A variety of professionals attended from every state, including veterinarians, researchers, and wildlife and pest animal managers. State and Australian departments of agriculture and environment were represented, as were several universities, the Australian Wildlife Health Network (AWHN), Australian Registry of Wildlife Health (ARWH), the IA CRC and the Australian Biosecurity CRC. Two representatives from New Zealand Department of Conservation and Landcare Research also attended. Members of the WEDPP management committee were included in this group. Representatives from Animal Health Australia and Australian Animal Health Laboratory were also invited but were unable to attend. Workshop attendees are listed in Appendix 1.

The workshop focussed on preparedness for diseases of concern to Australian wildlife and livestock. Issues affecting wildlife disease management that were considered include:

- exotic disease preparedness (training and research gaps)
- diseases already in Australia vs. not in Australia
- diseases affecting wide host range vs. narrow range
- diseases affecting livestock vs. native wildlife

Discussions included lessons learnt from recent outbreaks, and recent advances in wildlife disease management overseas (tuberculosis and Johnes disease in New Zealand).

The workshop did not specifically address zoonoses, although there was some discussion about whether wildlife diseases that affect humans should be a priority for research and management.

A report reviewing projects funded by WEDPP 1999-2007 and recent journal publications related to disease preparedness in Australia (Henderson 2008) was distributed to participants two weeks before the workshop.

2 See http://www.quarantinebiosecurityreview.gov.au/

The agenda for the workshop is provided in Appendix 2. There were three main sessions:

(i) Research review — covering the current status of research in areas related to disease preparedness

(ii) Training and preparedness review — covering the current status of wildlife management in the Australian Veterinary Emergency Plan (AUSVETPLAN) and training exercises

(iii) Infrastructure overview — covering WEDPP and AWHN roles and management.

Each session included a series of presentations followed by a facilitated discussion. Presentations focussed on the current status of research in wild population interactions, impacts of disease on native fauna, disease modelling, surveillance and AUSVETPLAN. The functioning and management of WEDPP and the AWHN were also described. Summaries of each talk are provided in the following three sections.

A dedicated facilitator led discussions, asking participants to discuss specific questions in small break-out groups, write individual thoughts on stick-it notes, and place these on a wall. The notes were sorted by the whole group into lists of similar themes. Small groups or individuals then developed recommendations for priority themes based on the 'SMEAC' format (a standard briefing format that lists the: current situation; mission required; execution, administration and control/communication plan of the mission).

2. Review of research

2.1 Presentations

2.1.1 Modelling to enhance exotic disease preparedness in Australia: A case study of foot-and-mouth disease preparedness in feral pigs

Brendan Cowled and Graeme Garner (Office of the Chief Veterinary Officer)

Infectious disease models are simplifications of real systems and are a cheap and efficient substitute for real world study. They are limited by the understanding of the system and availability of data. There are two broad approaches to modelling: mathematical and simulation modelling. Models have two main uses: prior to disease introduction or emergence, models can help decision making (what might happen if…?) After an epidemic, models can help investigate of methods of spread (what might have happened if….?).

In feral pig foot-and-mouth disease (FMD) preparedness, a number of models have been produced. These can be used as a case study for the state of infectious disease models in wildlife in Australia. The earliest models are all mathematical models. Their great advantage is that they highlight data/understanding gaps, and they provide a strategic understanding (a broad overview) of what may happen if FMD is introduced to feral pigs. They demonstrate that for a disease to fade out in feral pigs the population density must be reduced below a certain threshold and that rapid lethal culling will be required to achieve this. However, they make some unrealistic assumptions and do not cover the fine detail (or tactics) required in the face of an outbreak of FMD in feral pigs. Additionally, there are many important factors that heavily affect disease spread in feral pigs that have not been addressed within existing models, although some simulation models have begun to focus on these areas. These factors include population distribution and connectivity of feral pigs, heterogeneous population density, the role of concurrent susceptible species, movements of feral pigs, social and group organisation, age structure and climatic or seasonal effects.

There is an ongoing need for further infectious disease modelling in feral pigs that focuses on assimilating these factors to give greater confidence in outputs. Models should focus on detailed operational issues (tactics) and they should be produced with improved data. Results should also be shepherded through government to ensure that they are incorporated into policy.

2.1.2 Ecological approaches to the surveillance and management of wildlife diseases

John Tracey (NSW Department of Primary Industries)

Where information is available on host range and spatial and temporal variation in virus infection, we should be moving away from random sampling towards risk-based sampling approaches. In most cases random sampling over broad areas and across species is not desirable or practical for wildlife diseases. Current surveillance programs and AUSVETPLANs are outdated in this

regard and need to reflect these changes. It is important to integrate disease epidemiology and wildlife ecology to ensure surveillance and management of wildlife diseases is relevant and efficient. Examples of targeted studies with avian influenza (AI) and FMD were provided in this presentation.

(i) Avian influenza

To develop and implement a targeted (risk-based) surveillance system for AI in wild birds, two models for surveillance were proposed: (1) to assess the risks of wild birds introducing foreign AI subtypes and (2) to assess the risks of endemic AI viruses becoming highly pathogenic through interactions with poultry (Kirkland and Tracey 2006). This approach allows for early detection of foreign AI subtypes efficiently, and improves understanding of potential pathways of transmission. It also improves our understanding of endemic viruses.

Input data used for modelling included information on the virus and factors such as season and bird species, age, location, and range / migration pathway. All these factors affect the ability to detect AI virus. Priority areas to survey were identified from Birds Australia data, and from locations of commercial poultry operations and wetlands known to be important for shorebirds.

From this approach, 16,000 wild birds were sampled in 2005-7. Results showed 0.3% of samples were subtyped as having low pathogenic AI viruses and 13% tested had positive serology results. However, the specificity of tests, prevalence, abundance, and species involved (in many cases) are unknown. Evaluation of the results is needed to determine what the implications for occurrence, circulation and spread of AI is in Australia, whether we are dealing with an endemic source or foreign subtypes, and which species are involved.

(ii) Foot-and-mouth disease

A second example of FMD in feral goats was described. Contact rates of feral goats and domestic livestock were measured in New South Wales as part of a 4-year project, to model FMD outbreaks (Fleming 2004, Fleming et al 2006). Temporal and spatial SLIR (susceptible-latent-infectious-recovered) models were used with force of infection (frequency dependent) rather than the traditional density-dependent models with a transmission coefficient. Models that incorporated social behaviour markedly differed from those that excluded it. Without social behaviour, a temporal model was used assuming homogenous mixing, and the disease persisted. With social behaviour, spatial models incorporating probabilities of movement (resource selection function) predicted that the disease consistently died out within 35 days. This reflects the high rate of contact within herds but the minimal contact between herds.

In conclusion, surveillance and research of wildlife diseases is much more useful if ecological information is collected, including social ecology. Information on fundamental parameters such as species abundance, mortality, breeding and movements needs to be included. It is essential to integrate data on virus epidemiology and host ecology and behaviour to maximise efficiency of surveillance, to ensure relevance, and to evaluate aims and management implications.

2.1.3 Understanding feral animal populations

Steven McLeod (NSW Department of Primary Industries)

The presentation covered the definition of a feral animal, major influences on population dynamics, examples of distribution of some ferals in Australia and a summary of key points.

A feral animal can be defined as an animal that has escaped (or been released) from domestication and become wild. Examples in Australia include goats, pigs, donkeys, horses, and camels. Foxes, rabbits, hares and other wild animals are not classed as feral species. Deer may or may not be feral, depending on how they were introduced to the wild.

There are four components that affect feral population dynamics. Changes in a population can occur through births, deaths, immigration and emigration. These component events can be related by the formula:

$$N_{t+1} = N_t + B_t - D_t + I_t - E_t$$

N_t is population size, B_t is the birth rate, D_t is the death rate, I_t is the immigration rate and E_t is the emigration rate.

A population's growth can be limited in different ways. If the prey population limits the predator population, the system is referred to as having bottom-up control. Vice versa, if the predator limits the prey population, then the system is referred to as having top-down control. This concept is relevant to plant-herbivore or predator-prey interactions. That is, one trophic level controls another — a central idea in ecology.

Birth and death processes are influenced by competition, predation, parasites and disease, drought or other catastrophes. Immigration and emigration can occur in a number of different ways, and this needs to be determined for different feral populations for appropriate control actions. Models for immigration and emigration include traditional, central-peripheral, metapopulation, or source-sink movements.

Density dependence of populations of large mammals was discussed. Theory and empirical information support the conclusion that most density-dependent change occurs at high population levels (close to the carrying capacity). The population density of large herbivores (eg goats, pigs, donkeys, horses, camels) is thought to be limited by availability of food. In populations of large carnivores (eg dogs), social factors (territory size) are thought to be the most important influence on population density.

Feral mammals are widespread and abundant in Australia (distribution and abundance maps were shown for feral pigs and goats; from the IA CRC and National Land and Water Resources Audit's project on national mapping). There is significant overlap between the locations of feral populations and domestic stock in some parts of the country (maps were shown, indicating overlap between feral goats and sheep, and between feral pigs and cattle in Australia).

Effective population management requires four steps:

1. A goal (eg to lower the feral population or, more reasonably, to lower the level of damage).
2. Development of a model / management options to achieve the goal.
3. Implementation of the management option selected (and necessary data collection).
4. Evaluation to see that the management strategy is working.

In summary, it was noted that:

- all animal populations are influenced by the same factors (birth, death, immigration, emigration)
- many feral animals are highly abundant and widespread (despite ongoing control) in Australia

In terms of disease transmission, little is known about interactions between feral animals and domestic stock, and more research is needed in this area.

2.1.4 Implications of disease transfer to, from, and within multiple wildlife hosts and livestock in New Zealand

Graham Nugent (Landcare Research, New Zealand)

This presentation described some of the issues and current solutions for dealing with multispecies wildlife diseases, using bovine tuberculosis (Tb) and Johne's disease as examples. Recent advances in surveillance concepts were outlined, including the use of wildlife sentinels, spatial detection probabilities, and the use of multiple data sources to infer likelihood of disease absence (Nugent et al 2006).

(i) Bovine Tb

The complexity and multiplicity of bovine Tb transmission routes in New Zealand were outlined. Tb has multiple hosts in livestock and wildlife species, with possums as the primary wild source. Interactions occur between possums, farmed cattle and deer, wild deer, pigs and ferrets, as well as scavengers. Transmission can occur via inhalation or via scavenger ingestion of infected carcasses. These factors make Tb particularly difficult to control.

Primary habitats, population density, home range diameter, Tb prevalence and length of survival after infection were described for the main hosts (possums, ferrets, pigs and deer), showing a large variation between species. The variation in behaviour of the disease agent and these animals complicates infection between species — for example, while ferrets' primary habitat is farmland and its margins, and ferrets only survive 1 year post infection, deer inhabit forest and margins and may survive up to 10 years post infection.

Information on the behaviour of the hosts and disease agent is crucial for designing control operations at the right time and scale, since post-control outbreaks of Tb can originate from distant sources (once local livestock and farmland possums are controlled).

(ii) Johne's disease

A formal survey of this wasting disease in New Zealand wildlife showed that many mammal and bird species are infected, and that relative prevalence varies widely across the country. The high infection occurring in wildlife, especially in wide-ranging species, means disease freedom cannot be achieved by on-farm management alone. Knowledge of host status and range use is therefore strategically crucial for disease control.

(iii) Confidence of disease eradication

How do we decide when it is safe to stop management after a pest or disease has been eradicated? Failure to detect any disease or survivors may mean that the pest or disease is truly absent, or simply that it was not detected. A total survey with perfect detection is the only way of being certain, but is not affordable over large areas, especially when the surveillance tools are not perfect.

With multihost diseases such as Tb, classical population sampling may be an inefficient surveillance approach compared with individual-based detection. The use of possums to confirm Tb freedom is not practical due to their small home range (it would be too expensive to comprehensively sample possums over a large area). Rather, an approach to use other wider-ranging species (particularly wild pigs and deer) as sentinels of Tb was described. Although these species are not capable of maintaining the disease, they can indicate exposure from possums, and hence the presence of Tb in possums.

GIS integration of sentinel ranges (using a number of species and/ or sexes) can be used to calculate surveillance coverage and detection probability, and therefore the confidence of declaring disease freedom. Surveillance results can be combined with data from trap-catch indexes of possum abundance to further indicate probability of disease eradication. Illustrative disease models were described, where this data from multiple complex sources is incorporated using a Bayesian Updating Framework.

Integration into models of data from multiple sources can produce a very high level of confidence of disease freedom.

2.1.5 Impacts of disease in native fauna in Australia

Karrie Rose (Australian Registry of Wildlife Health; http://www.arwh.org/ARWH/home.aspx)

Although historically, wildlife and invasive species health surveillance in Australia has fallen into gaps between agriculture, conservation and human health agencies, there are many factors that are driving increased interest in wildlife health, particularly as it relates to biosecurity. These drivers include:

- that 75% of recently emerging and re-emerging zoonotic disease emanate from a wildlife reservoir
- public concern regarding animal welfare, food safety issues and disease transmission from wildlife
- protection of biodiversity, human health, domestic animal health and international trade
- bioterrorism detection
- climate change and its effects on animal and human health.

Wildlife disease outbreaks can have an enormous economic impact. Some international examples include Nipah virus (costing $US400 million in Malaysia), FMD (costing $A19 billion in United Kingdom 2001) and avian influenza (estimated at $US1.25 trillion in the event of a human pandemic).

The World Health Report 2007 illustrates how infectious disease is spreading further and more rapidly than ever before and how new diseases are emerging at the increased rate of one per year (with each new disease over the past 10 years emanating from wildlife reservoirs). Global trends that are linked to disease emergence include: increased migration and international travel/trade, climate variability and change, changes in the distribution and availability of surface waters (land use, irrigation, drought, dam construction), uncontrolled urbanisation and urban sprawl, changes in agricultural practices, deposition of chemical pollutants including fertilisers, herbicides and pesticides, conflict (war), accidental or intentional human introduction of pathogens, and poverty. These trends are unlikely to be reversed in the short term. The best method to combat disease emergence is rapid and accurate detection, diagnosis and response. Thus, we need to bolster our surveillance and biosecurity systems, particularly in regard to wildlife and invasive animal health.

Within Australia there are now several programs emerging to incorporate wildlife and invasive animals into mainstream disease surveillance programs. Wildlife health and biosecurity in Australia involves the Australian Registry of Wildlife Health (ARWH); the AWHN; DAFF; Department of Health and Ageing (DoHA); Department of Environment, Water, Heritage and the Arts (DEWHA); IA CRC; Australian Biosecurity CRC (AB CRC); Animal Health Committee (AHC); Animal Health Australia (AHA); Australian Antarctic division, and Northern Australia Quarantine Strategy. International links exist with Wildlife Health Centres in Canada, United States and New Zealand.

There has also been increasing acceptance of a unified approach to share resources and better understand and control health and disease through the concept of 'One World, One Health'. The sharing of essential health resources and information is the best route to global public health security.

The ARWH operates as a resource centre capturing and disseminating information relating to healthy and diseased native fauna and zoo animals. The registry is also a diagnostic centre, investigating outbreaks of sudden death or disease on behalf of wildlife managers, conservation departments, wildlife rehabilitation groups, the RSPCA and zoos. The registry's wildlife caseload exceeds that of all state and Commonwealth agriculture laboratories combined!

The role of the ARWH in wildlife health and biosecurity includes:

- the capture and dissemination of large volumes of primary health data (dating back 23 years)
- direct disease investigation
- assisting other agencies with disease investigation through second opinions and access to local and overseas reference material
- comparison of recent and historical case material to differentiate disease emergence from reappearance of endemic disease
- maintenance of an Expertise and Resource Registry
- targeted wildlife and ecosystem health related research
- education and training (curriculum development, course delivery and supervision of individual students) to build capacity in the field.

2.1.6 National disease surveillance, and research priorities for wildlife

Rupert Woods (Australian Wildlife Health Network; http://www.wildlifehealth.org.au)

Why do we need surveillance? It is now recognised that those countries that conduct disease surveillance of their wild animal populations are more likely to detect the presence of infectious and zoonotic diseases early and to swiftly adopt counter measures.

An increasing awareness of the risks of emerging disease and the role of wildlife is prompting the development of a more integrated approach to surveillance activities in Australia. Key initiatives and organisations include: the National Animal Health Surveillance Strategy, Northern Australia Quarantine Strategy, AWHN, ARWH, and two cooperative research centres (IA CRC and AB CRC). Each of these agencies was briefly overviewed. Several other activities involving surveillance at a national level were described including work on bat viral diseases and some native fauna disease investigations.

In Australia, a system of state and territory coordinators captures and report wildlife disease events. Currently six disease categories form the basis for reporting: 1) OIE list diseases, 2) bat viral diseases, 3) mass or unusual mortality events 4) salmonella cases 5) arbovirus cases 6) other diseases that state/ territory coordinators think are interesting or unusual. Reports are generated for a variety of national agencies, and also for the World Conservation Union Species Survival Commission.

Priorities for wildlife health research recently identified by AWHN members include the need to:

- review existing models and mechanisms for research prioritisation and adapt optimal model for wildlife health
- conduct specific workshops to identify current level of knowledge, prioritise research questions and identify policy shortfalls for selected diseases that include wildlife as part of their ecology
- conduct projects exploring ecology, epidemiology and management of diseases of interest (eg avian influenza, arboviruses, leishmania)
- support of a research Master's and Quality Assurance program in wildlife pathology.

Priorities identified for education and training include:

- a wildlife health communication and education package (eg including a wildlife post-mortem manual, exotic disease recognition/ identification and management course)
- digitisation, web-enablement and dissemination of material contained within ARWH.

Priorities identified for capacity building include the need to:

- develop a real-time wildlife health surveillance system, which includes the ability to detect emerging diseases (identified as the highest priority)
- develop a mechanism for emerging and emergency wildlife disease management ('How do we notify?' and 'How do we respond?')
- conduct a feasibility study examining development of a national wildlife research centre

- develop and implement a management strategy and succession plan for the Australian parasitology catalogue and database and the national insect collection.

It was concluded that although there are many good research and policy initiatives currently occurring in Australia, there is a need to continue efforts to integrate wildlife health surveillance activities into national frameworks, better coordinate activities between agencies and recognise the mutual need for sustained direction and focus.

2.2 Discussion — key research priorities

Diseases of concern:

Nine identified priority diseases (FMD, rabies, classical swine fever, avian influenza — AI, leishmania, henipaviruses, rabies, chytrid fungus, West Nile virus —WNV) were briefly discussed using template sheets to identify gaps in knowledge and priorities for research. Participants highlighted the need to identify high-risk locations for classical swine fever, leishmania, henipaviruses, WNV and AI virus. The need to obtain data for constructing models was also identified, particularly on contact between populations in the wild and wild–domestic interactions for AI virus, WNV, FMD, rabies and henipaviruses. Further research on ecology (of the disease agent and its hosts) is needed for rabies, AI, WNV, henipaviruses, chytrid and FMD.

It was also noted for rabies that research is needed on surveillance strategies, modelling or control mechanisms. Development of control strategies for chytrid disease and henipaviruses was also given a high priority. For WNV, gaps were identified in all areas of research listed on the template for birds, native and introduced mammals.

For highly pathogenic AI, further research is needed for alternative surveillance strategies and control strategies. Research is also needed on determining how low pathogenic AI virus circulates in native birds, whether it is endemic, how it is maintained, and what factors change its virulence. Genotyping AI subtypes to compare with overseas types was also considered important research. Continued prevalence surveys for AI and Newcastle disease viruses was another identified priority.

Lists of diseases of concern in the Henderson (2008) report and AUSVETPLAN Wild Animal Response Strategy (WARS) were briefly reviewed. Participants listed the following diseases as of most concern, based on 'gut feeling' (not in order of priority): surra, leptospirosis, Q fever, chlamydiosis, salmonellosis, anthrax, air sac mite, avian influenza (H5N1), bluetongue, avian malaria, chytridiomycosis, mycobacteriosis, Japanese and West Nile encephalitis, screw worm, henipahvirus disease and chikungunya fever.

It was concluded that there is a lack of an agreed matrix for identifying information gaps and for identifying priority diseases.

Note that these discussions were preliminary, based only on participants' knowledge on the spot. Although some priority areas for research were highlighted from these exercises, they were not considered to be comprehensive analyses.

Question: 'What should be a key research priority for environmental and production diseases for WEDPP?'

The individual notes are listed in Appendix 3.

Key research priorities identified were:

- Prioritisation systems for funding and research — including a system/s to identify high risk diseases, potential wildlife pathogens, and species to be protected (discussion also included whether human health should be a factor in prioritising diseases).
- Emerging diseases in wildlife.
- Disease impacts on native fauna, whether the disease is exotic, or an emerging endemic.
- Ecosystem health — defining specific indicators of ecosystem health.
- Bat virus research.
- Environmental change and wildlife disease — including ecotoxicology and climate change effects.
- Research into disease ecologies — including ecology of diseases such as avian influenza and coronaviruses, and ecology of wild animal hosts.
- Modelling priorities — obtain data on spread of vectors through wildlife populations (including contact rates and transmission routes), and on multihost infections.
- Surveillance priorities — developing methods for syndromic surveillance, for key wildlife diseases, determining detection capabilities for survey efficacy.

These themes were put into a sequence, suggesting that foundational activities such as setting a transparent prioritisation system for research should come before research into surveillance and ecology, which should precede modelling research. Participants also emphasised the need for infrastructure to support wildlife disease investigation, information management and sharing.

2.3 Recommendations for research

Groups or individuals drew up recommendations (using SMEAC format) for targeted disease surveillance, basic ecology, prioritising wildlife health, environmental changes, a one-health approach for emerging wildlife diseases, and modelling for contingency planning. These are outlined below.

2.3.1 Targeted disease surveillance

Situation: There is currently a disjointed approach to wildlife disease surveillance.

Mission: To improve the effectiveness and efficiency of wildlife disease surveillance.

Execution: Through targeted pilot projects.

Administration: Funding from industry, where applicable, and government. Could be administered by WEDPP management committee, a (possibly WEDPP) surveillance specialist subcommittee and the AHC. Monitoring and evaluation could be done by management and particularly by the specialist subcommittee.

Control/ Communication: Results should be reported to WEDPP management committee, the specialist subcommittee and AHC. Targeted research should also be reported to identified stakeholders. Results should be communicated through final report, journal publication, and annual WEDPP conference or meeting.

Results from pilot projects should be monitored and evaluated, and recommendations should be incorporated into policy where applicable, and/or used to design larger-scale projects or other specific pilot projects. A feedback loop of project results into policy or further research was outlined.

2.3.2 Distribution, contact rates and basic wildlife ecology

Situation: Lack of knowledge of contact rates, of basic ecology with respect to disease, and of distribution data (and mixing populations). It is difficult to develop management responses given the current level of information. The example of deer was given as a priority species to research.

Mission: To improve knowledge on wildlife ecology with respect to disease, within a triple-bottom-line framework.

Execution: Prioritise and fund research.

Administration: Funding could be provided by WEDPP, 'Caring for Country' and DEWHA. Administration should be done by a steering committee, which must include a wildlife ecologist. Who/how to monitor and evaluate (including determining when milestones are met) was unclear.

Control/ Communication: Control should be centralised through a body such as the AWHN and/ or funding bodies, including AusBIOSEC, industry, AHA, Vertebrate Pests Committee (VPC) and others. Recommendations should be implemented through Australian Pest Animal Strategy, threat abatement plans, education and training.

2.3.3 Identification and prioritisation of wildlife health

Situation: There is an increasing frequency of new and emerging diseases, 75% of which have a wildlife origin/link. Australia has very limited capacity to recognise and manage these diseases. There are only limited resources, especially for long-term mechanisms. A number of different bodies are currently working in this area, but they are uncoordinated and may have competing priorities: there is no system in place to nationally prioritise and coordinate activities.

Mission: To develop a process, framework and infrastructure to identify wildlife health priorities and ensure these priorities are actioned.

Execution:

- Identify someone to coordinate the process (eg AusBIOSEC, WEDPP).
- Identify stakeholders (environment and agriculture departments at state and national level, non-government organisations, AWHN, universities, primary producers, AHA, and others identified through advertising).
- Conduct a workshop to identify a risk assessment process and resources, appoint a project officer and develop a project plan. Recommendations from the workshop should be presented to AusBIOSEC.

Administration: Funding could be provided by WEDPP or AusBIOSEC. Administration could be done by WEDPP, AusBIOSEC, Agriculture/Environment departments, and a dedicated steering group.

Control/ Communication: Results from each step should be reported to stakeholders, government, DAFF/DEWHA/AusBIOSEC. WEDPP and AHA could potentially work out a cost-sharing agreement. Oversight groups could control research on wildlife priority disease, disease ecology, wildlife ecology. Outcomes group could evaluate and incorporate recommendations in to policy (including WARS).

2.3.4 Impact of climate change and landuse change on emerging diseases

Situation: The potential impact of an increasingly changing environment (due to anthropogenic and climatic changes) on ecology/epidemiology of many diseases is currently unknown.

Mission: To improve knowledge through research and environmental scanning.

Execution: Climate and habitat matching/modelling using predicted parameters of climate and landuse change, to predict potential distributions and abundance of disease and potential cross-over into livestock populations, susceptible wildlife populations and high density (urban) human populations.

Administration: Funding could potentially come from impacted animal industries (eg Meat and Livestock Association, Australian Wool Innovation, AHA), health/ agriculture/ environment departments, and AusBIOSEC's successor. Animal health agencies, environment agencies and human health agencies (for zoonotic diseases) need to be involved in administration, monitoring and evaluation.

Control/ Communication: Not completed.

2.3.5 A one-health approach for managing the ecology of emerging wildlife diseases

Situation: A policy-based approach, underpinned by sustainable funding, is currently lacking for managing emerging diseases.

Mission: To develop and establish a one-health approach for managing risks from disease emergence by a cross-sector, national/ regional mechanism. Livestock industries, public health, environment and plant health agencies should all be involved.

Execution: Prioritise risks by collating and reviewing intelligence, and identifying gaps. Address priority gaps in wildlife disease ecology

Administration: Funding should be arranged through a cost-sharing agreement across sectors (including state and Commonwealth levels). Administration, monitoring and evaluation should be done through an advisory network including representatives from AWHN, livestock industry, Communicable Diseases Network of Australia, and Public Health Laboratory Network. The relationship of such a group with AusBIOSEC and the Australian Biosecurity Intelligence Network (ABIN) is unknown.

Control/ Communication: Uncertain of details, but could work through an AHA-type model.

2.3.6 Enhanced modelling for contingency planning

Situation: Any contingency plan relies on a model (explicit or implicit; ie intuitive). Explicit models that are written are reviewable and transparent. Difficulty is in understanding transmission and contact rates (relevant to disease ecology and epidemiology), so there is a need to improve knowledge in this area.

Mission: To set up a process to collect information on contact rates for targeted diseases, to allow more realism in modelling. If an epidemic occurs, there needs to be a prior plan to start collecting data for modelling and management.

Execution: Identify priority diseases, species, principal hosts and high-risk areas. Priority could be determined by feasibility of research, urgency and cost.

Administration: Funding could be obtained from agencies involved with wildlife disease (environment, health, agriculture, at state and federal levels) and private industry. Administration should be by a collaborative effort/ a broader steering group, not just DAFF.

Control/ Communication: Feedback should be to all interested agencies, as there is no wildlife health equivalent of the National Health and Medical Research Council.

3. Review of preparedness policy and training

3.1 Presentations

3.1.1 AUSVETPLAN overview

Glen Saunders (NSW Department of Primary Industries)

A history of outbreaks of introduced animal diseases in Australia highlights the need for emergency response plans. Examples include FMD outbreaks in 1800, 1803, 1871 and 1872; rabies in 1866; classical swine fever in 1903, 1927, 1942, and 1961. Others include rinderpest in 1923, scrapie in 1950, bluetongue in 1977 and chalkbrood (a bee disease) in 1994.

Emergency management involves four key elements:

- prevention — quarantine, biosecurity, risk reduction
- preparedness — training and awareness
- response — surveillance, destruction, vaccination
- recovery — compensation, counselling, re-stocking, disease freedom, re-establishing markets.

The purpose of the AUSVETPLAN is to guide technical response to a disease outbreak: it is not a set of standard operating procedures. The plan is linked to each state's emergency services and supplies guidance for a coordinated national response. It provides a basis for developing industry plans and also provides focus for training and response testing.

AUSVETPLAN components include:

- disease strategies (eg for FMD, rabies)
- operational procedures (eg. destruction)
- enterprise manuals (eg abattoirs, feedlots)
- management manuals (eg control centres)
- Wild Animals Response Strategy – WARS
- resource documents (eg response policy)
- information systems
- agency support plans (eg police, Rural Land Protection Board)
- diagnostic resources (eg field guides).

The latest version of WARS was written in 2000, and published as Version 3.2 in 2005. It is composed of two parts: Strategic and Operational Guidelines. The contents of each part were described.

The Strategic Guidelines includes an introduction followed by chapters on Exotic Diseases of Concern, Species Ecology and Biology, Principles of Disease Control and a Decision-Making Key. The breakdown of each chapter was briefly described.

The decision-making key provides a guide to strategic planning, with four phases/time scales:

- risk assessment — immediate/short term
- surveillance — short to medium term
- operational decisions — medium to long term
- evaluation — long term.

Epidemiological decision factors to be considered include characteristics of the disease, the epidemiological importance of wild animals, population density sought after control, and the need for carcass disposal. A key question to be answered is whether the disease can be controlled by vaccination of wild animals or by using novel methods?

Ecological decision factors that need to be considered include the location of the outbreak (habitat, proximity to enterprise and humans), season and presence of other susceptible species. The initial density of susceptible species, desired density sought after control and attainability of this desired density need to be determined. Likely movements of susceptible species (under normal conditions, when carrying disease and in response to control) and contact rates with like and other species also need to be considered.

Resource decision factors include availability of key resources, resources needed to achieve target density, the need for carcass disposal and costs and benefits of different techniques. The availability of expertise and knowledge is also an important factor. The availability of vaccines and methods of delivery may also need to be considered in an outbreak response.

Socio-political decision factors include cost/ benefit considerations, legal ramifications of actions and public opinion and safety. Occupational health and safety of operational staff also needs to be considered, as does relevant government policy at a federal and state level.

The second part of WARS is the Operational Guidelines. The contents of this part include an introduction, and guidelines for population survey, disease sampling, population reduction, population containment and sympatric species operations. Additional information included in WARS includes role descriptions, sources of information, reporting forms, a glossary and references.

A key issue in wild animal response strategy is:

> 'Local knowledge is essential in assessing the status of wildlife populations. Similarly, wildlife/vertebrate pest officers or species experts/wildlife biologists should be consulted to obtain current and local information on the ecology and behaviour of susceptible wild animal species. The manual cannot be all-inclusive; a key message is consultation.'

3.1.2 Preparedness exercises

Chris Bunn and Brendan Cowled (Office of the Chief Veterinary Officer)

Chris Bunn gave a brief outline of exercise management. In the absence of actual emergencies, exercises are an ideal way to test, assess, and evaluate the arrangements that have been agreed to, documented and implemented. Exercises provide an opportunity to practise the arrangements in a 'non-threatening' environment and to identify opportunities for improving those arrangements.

Identify the need: The need to prepare or take action to exercise will come from a range of sources. This could include work done to analyse and assess risks, and outcomes from previous activities (such as training, education, resourcing, exercises, actual response and/or recovery operations).

Training and exercising should be seen as a continuous improvement cycle.

Planning should be based on all hazards response plans. That is, the response to all emergencies should be closely similar to each other.

A culture of evaluating all actions should be encouraged and included in the training and exercises. Evaluation should look at the effectiveness of:

- response and recovery planning
- training, education and resourcing
- response and recovery operations
- exercises.

A process is required whereby the recommendations from activities are reviewed and evaluated to identify if they are appropriate and or achievable.

Brendan Cowled briefly summarised the recent exercise in the Northern Territory on a simulated outbreak of disease in feral pigs. One key point was that confusion and delay occurred in the exercise, due to the use of 1080 in this territory being illegal.

3.2 Discussion — improving preparedness

Question: 'What does WEDPP have to do to be ready for an outbreak this year?'

Individual points made during this discussion centred on reviewing knowledge, defining people's roles and responsibilities, training, and information issues. Individual answers are listed in Appendix 3.

Highest short-term priorities include the need to:

- prepare a skilled personnel list — a register of skilled people, and include rapid response training in their role in disease preparedness and response
- identify a pool of money for emergency preparedness investigation
- identify roles and responsibilities
- conduct a technical review of WARS and update it (last edited in 2000)
- conduct training exercises — both desktop and field, and identify gaps in communications, technical processes (eg diagnostics) and surveillance
- review state and national legislation relevant to use of poisons, etc in an emergency response.

Longer-term priorities identified were to develop:

- an integrated national training plan (with recommendations from skills register above) — at all levels of jurisdiction and especially for roles of wildlife officers in an emergency
- a national information system — mapping etc, sort out reporting consistency and data sharing issues
- clear guidance for animal welfare
- protocols for releasing rehabilitated wildlife.

3.3 Recommendations for improving preparedness

Groups drew up recommendations for a skills register, roles and responsibilities, sharing data, providing guidance on animal ethics and reviewing legislation relevant to WARS.

3.3.1 Updating a skills register

Situation: There is no established list of personnel skilled and / or trained in the area of wildlife and disease emergency management. A national list did previously exist. *[Comment added after the workshop: The ARWH maintains a current Expertise and Resources Registry — as a skills register, register of available tests, and virtual tissue bank. This list is used by the Wildlife Disease Association - Australasia and the Australian Society for Veterinary Pathologists, and is available at http://www.arwh.org/ARWH/Expertise/Expertise.aspx]*

Mission: To re-establish a skills register.

Execution: Locate the old list and update via state agencies.

Administration: Limited resources would be needed. IA CRC and WEDPP could nominate someone to do the job then circulate the list for review.

Control/ Communication: Recommendations could be provided to the AWHN, AHC and VPC.

3.3.2 Defining roles and responsibilities

Situation: There is a process in place for initial assessment of production animal health events, but little in place for purely wildlife events. Wildlife disease has the potential to impact on trade, human health, and agriculture economy. A process is needed for initial assessment of events and roles and responsibilities related to wildlife health. A source of funding is needed to investigate wildlife disease events.

Mission: To develop a mechanism and funding for the initial assessment, diagnosis and investigation of a wildlife health event at state or national level. Define roles and responsibilities for reporting and responding.

Execution: Multijurisdictional approach that will link across agencies and jurisdictions at a local, state and federal level.

Administration: Cost-sharing arrangement could be between DAFF, DEWHA and DoHA and states. AHA could also be involved. Management could be by a group of representatives from each of these departments, plus others as appropriate (eg Chief Veterinary officers, AHC and

Consultative Committee on Emergency Animal Disease). This group would decide if a wildlife disease event warrants investigation, with funding from an established common fund for the initial investigation. If the event is identified as an infectious process, it could then be directed to DAFF or DoHA; other events (eg toxicology) could go to the appropriate department/ jurisdiction to manage through their normal processes. Funds could be virtual or real.

Control/ Communication: The appropriate department / jurisdiction could manage the disease event through their normal processes.

3.3.3 Sharing data on wildlife distribution and abundance

Situation: Data exists for some wildlife. For feral animals, data varies with regard to distribution, abundance and occurrence. Differences in spatial scales, currency and quality are also apparent for ferals and native wildlife data. There is a need to identify what databases exist and to identify custodians for the data. We also need to improve access and exchange / use of available information.

Mission and Execution: DAFF needs to draw on all available information relevant to possible scenarios for disease outbreaks. A framework for timely and efficient access to data and information also needs to be developed. DAFF's central role would be to coordinate these activities (through the wildlife health network).

Administration: All lead agencies at state level should be involved with DAFF. State and territories should be involved with coordination and cost-sharing (although given progress to date, in-kind contribution could be sufficient). Advice would need to be drawn from VPC and WEDPP community (and a wildlife equivalent if there is one) on specific needs regarding data.

Control/ Communication: This mission would need a lead agency or group to make an interoperable environment, where individual data is maintained at a state level, but accessible via a central database. Recommendations should possibly go to PISC. Communication of results could be via PISC and NRMMC.

3.3.4 Guidance on animal welfare

Situation: Animal welfare concerns transfer poorly into the field. This problem can throw a whole project into jeopardy if handled poorly.

Mission: To anticipate negative outcomes in advance, to consult with government and non-government organisations to ensure knowledge transfer to on-the-ground practitioners.

Execution: Animal welfare policy should be incorporated into WARS and training.

Administration: The WEDPP steering committee could provide the necessary administration.

Control/ Communication: Animal welfare guidelines in relevant documents should be reviewed and evaluated at regular intervals.

3.3.5 Review of legislation relevant to WARS

Situation: State legislation related to wild animal response and management is continually changing. Lack of knowledge of current legislation could hamper field responses to a disease outbreak, or result in (unintentional) illegal activities (eg the use of 1080 in exercise 'Wild Thing').

Mission: To review and understand this legislation to ensure it is up to date and effective for a wildlife disease outbreak. For example, rules and regulations on the use of 1080 toxin, rights of access to indigenous lands and so on.

Execution: Conduct a review of the legislation.

Administration: This review could be done as part of an overall review of the WARS.

Control/ Communication: The review could be overseen by the review committee. Results could be published with the updated WARS.

4. Review of infrastructure

4.1 Presentations

4.1.1 WEDPP structure, management and constraints

Chris Bunn (Wildlife Exotic Disease Preparedness Program)

Current objectives of WEDPP are to:

- develop and refine technologies for the survey, containment and control of wildlife consistent with the control of emergency animal diseases
- develop and refine wildlife disease control and surveillance techniques for use in an emergency animal disease
- develop a national team of trained personnel who are competent to perform their role in wildlife disease control in an emergency animal disease
- produce strategies and procedures for AUSVETPLAN
- promote interaction between animal health and wildlife personnel in the emergency animal disease preparedness area.

Activities supported by WEDPP include studies that will provide an assessment of the risk of feral and wild animals in the introduction, maintenance and spread of emergency animal disease. They also include development of techniques that identify key risk areas and rapid risk analysis procedures for feral and wild animals in an emergency animal disease. Field research is supported, preferably involving pest animal management and/or game meat authorities, to develop and conduct wildlife disease surveillance techniques. Fully integrated disease exercises with research, training and demonstration objectives have also been funded by WEDPP, involving a wide range of stakeholders and with feral or wild animals as a component. Education and training programs, for a wide range of stakeholders in AUSVETPLAN wildlife disease control strategies, have also been supported by WEDPP.

Constraints on WEDPP (imposed by cabinet) include:

- funding is based only on a yearly basis — making research difficult to carry over and making receipt of final reports difficult to achieve on some occasions
- projects are mainly restricted to state governments and CSIRO, as funding is dependent on co-contributions — precluding universities and other research parties from applying for WEDPP grants
- projects should relate only to livestock — limiting opportunities to research wildlife issues.

4.1.2 Australian Wildlife Health Network overview

Rupert Woods (Australian Wildlife Health Network)

The AWHN is an initiative of the Autralian government, managed under WEDPP, with a corporate governance structure. The management group is primarily made up of representatives of (federal) government.

The AWHN aims to promote and facilitate collaborative links in the investigation and management of wildlife health in support of human and animal health, biodiversity and trade. Its founding principles are that it focuses on free-living populations, and demonstrates scientific objectivity and complementarity. It is a multi-organisational collaboration operating at a national, not state-based level, providing functions that the states and territories cannot: coordinated surveillance at a national level, provision of information and linkage building. Its vision is for a nationally integrated wildlife health system for Australia.

Key business objectives of the AWHN are to:

1. Coordinate a network of wildlife health expertise and resources (including administrative support).

2. Maintain and expand the functionality of a national database (wildlife health information system, WHIS) including access through a dedicated web site.

3. Coordinate and monitor field surveys and/or investigations of disease incidents.

4. Promote the development of regional and national wildlife health emergency preparedness and response strategies.

5. Improve education and training in wildlife health.

Core business activities are twofold. Firstly, the network conducts wildlife disease surveillance, identifying emerging diseases and trends in known diseases (spread, frequency, species affected) that may affect trade, human health or biodiversity. The AWHN also manages and provides information; data is collated, analysed and disseminated to support Australia's lead agencies.

Achievements to date:

- general wildlife surveillance system in place, including a system of state and territory coordinators
- reporting of wildlife disease in six dedicated categories
- a rapid alert system ('First alert system') — eg used for avian influenza
- weekly electronic digests of wildlife health information of relevance to the region
- website and databases (WHIS) in place (and alignment with other government systems)
- targeted projects established
- avian influenza wild bird surveillance program
- focus group to coordinate all activities involving Australian bat lyssavirus
- West Nile virus targeted surveillance program
- quarterly and annual reports produced and provided to a number of agencies, including the NAHIS and an annual OIE report.

Other activities that AWHN have been involved with include AUSVETPLAN reviews (eg Australian bat lyssavirus, avian influenza, rabies, WARS, AQUAPLAN/AQUAVETPLAN) and representation on various wildlife health groups (NAHSS, NAHIS, Frawley wildlife working group, AB CRC wildlife working group, IUCN Veterinary Specialist Group, Australian Animal Welfare Strategy and Devil Facial Tumour Disease Program reviews, Wildlife Disease Association informatics working group), identifying needs and priorities. AWHN has been involved in capacity building, through a universities group, zoos group, CSIRO's Australian Animal Health Laboratory training course and national wildlife carer network. International linkages have been established with

Canada, United States, New Zealand, France, England and India. On a national level, linkages between health and conservation sectors have been established. Almost every activity involving wildlife health in Australia has input from a network subscriber (there are currently over 900 subscribers).

During the past five years a number of wildlife health issues have arisen, involving the network in substantial work outside the agriculture sector. Examples include diseases impacting biodiversity (eg chytrid fungus, devil facial tumour disease) and human health (eg avian influenza, mass bird mortalities in Esperance). These examples show the value of the structures DAFF and AHC have put in place for improving management of diseases with wildlife as part of their ecology.

Despite these increasing demands, the AWHN resource and funding base has not increased substantially and the AWHN is now at a crossroads. It needs to either rapidly expand its funding base to address these needs, or review its activities with a view to radically decreasing its scope (and therefore its effectiveness).

To survive in the short-to-medium term, AWHN staffing would need to increase to at least six fulltime staff, with an operating budget of approximately $800,000 made up of equal contributions from the four key beneficiary agencies (federal departments of health, environment, education and agriculture). These funds would enable the network to take advantage of the systems and activities already developed and apply these to benefit wildlife health situations affected and managed by other agencies. Ultimately, the AWHN may require up to 20 fulltime staff across Australia to be fully effective.

In summary, there is a need for sustainability of the network in a fluid environment. There are real opportunities with WEDPP and AusBIOSEC (and other agencies and initiatives). AWHN is the only agreed national solution to Australia's wildlife health needs and it needs to stay on task and continue to integrate activities across agencies and departments, and integrate into national systems.

4.1.3 Current status of integrating wildlife health into the Australian Biosecurity Intelligence Network

Karrie Rose (Australian Registry of Wildlife Health)

The ARWH and the AWHN have been collaborating in a submission to the National Collaborative Research Infrastructure Strategy (NCRIS). Their goal is to integrate wildlife health into the National Biosecurity Framework (NCRIS Section 5.8).

The NCRIS program is an initiative of the Department of Education, Employment and Workplace Relations. The goal of the NCRIS is to coordinate strategic development of infrastructure nationwide, to facilitate research activities addressing the national research priorities. The vision of NCRIS 5.8 is to form an Australian Biosecurity Intelligence Network (ABIN). It is proposed that ABIN will provide a shared workspace for collaboration across organisations, jurisdictions, and sectors. ABIN will consist of a virtual community of researchers and others involved in surveillance/response supported by:

- a small core group of information technology people (eg network, application developers), information managers and a repository of expertise (predictive analysis, content moderators)

- a comprehensive online, collaborative and connected workspace that provides access to a variety of databases critical to biosecurity and appropriate analysis tools (eg mapping, spatial analysis, statistical).

ABIN will provide the necessary information and tools to support activities across the full spectrum of biosecurity including research, disease surveillance operations, and acting as a repository for scientific knowledge and a resource for training and mentoring. To address the issues of acceptance and participation, ABIN will be developed using a series of initial projects of national merit already supported by a group active in collaboration. These projects, while being fully functional systems, will also act as demonstration systems of generic components and functionality to wider application in biosecurity.

A one-day workshop was hosted by the ARWH in August 2007 to identify critical infrastructure and discuss the integration of wildlife health within NCRIS 5.8 — the National Biosecurity Framework. The workshop involved key stakeholders in government departments and wildlife health professionals to initiate the process of integrating wildlife and invasive species health into the framework.

Efforts to date have resulted in the integration of a national wildlife health and communication system into the NCRIS 5.8 bid, as one of its five key platforms (human, livestock, plant, aquaculture and wildlife/invasive species health) that will have access to the resources within ABIN. Wildlife and invasive species health has also been integrated across four of the pilot projects (salmonella, emerging influenza viruses, arboviruses, and veterinary pathology training). The 'One World - One Health' concept and an ecosystems approach to understanding the ecology of disease causing agents, which were introduced at the wildlife workshop have also been adopted throughout the project proposal.

A complete investment strategy and business plan have been recently approved by the NCRIS Committee. A host agency for ABIN has been selected. A steering committee is currently selecting a chief executive officer and board to administer the governance of ABIN.

4.2 Discussion — need for a national agency for wildlife health issues

It was suggested that a national wildlife health body like the AHWN should be the federal government's responsibility to fund and ensure its ongoing survival — that wildlife disease is indeed a national issue. Participants felt the structure of a national body would depend on the outcomes of the current development of AusBIOSEC and ABIN, and possibly the federal quarantine and biosecurity review.

Participants were asked if state governments would be happy to have federal government direct disease preparedness management. The general response was that they would be happy to be involved and receive guidance from the federal government, but that there would be a need to consider individual state's needs and constraints, and not expect states to pay full costs. Some thought that asking states for monetary co-contributions (ie not just in-kind support) was acceptable and analogous to an insurance policy allowing for the expectation that the federal government would deal with full costs and response actions if an emergency outbreak occurred.

A similar system currently exists in Canada. It was commented that issues of communication gaps between states; between state and federal levels; and between agriculture, health and environment departments need to be addressed.

Question: 'Given the range of projects we need to work on, what sort of structure will we need?'

Self-designated groups were given time to develop a model for supporting the functions of wildlife health management, and then had the opportunity to present these models.

Two models were presented, but there were some groups who did not develop a model, or did not agree with those proposed — there was no consensus on a best system. However, the general mood was that the models proposed showed how the structure of WEDPP could develop over time, and there was support for exploring the options further.

The first model proposed AWHN as a central body with an AHA-like cost-sharing management structure with a chief operating officer. AusBIOSEC could provide top-level policy support, with state and federal departments for agriculture, environment, health and education also feeding policy in. Feeding out from this central agency, operations, policy priorities, grants and externally funded projects could be managed by separate sectors as appropriate, under AWHN guidance. Interactions between AWHN and the CRCs, universities and ABIN were also modelled in. Funding could be sought by either getting relevant parties to meet and sort out cost sharing, or by lobbying government through Deputy Secretary level meetings, ministerial lobbying, or through the AB CRC's rebid process.

The second model proposed a central WEDPP/ AWHN or similar program, and a 'One Health' structure (incorporating ABIN, IA CRC and AB CRC), with top-level support from AusBIOSEC. The AWHN would focus on its core activities of information gathering, advocacy and surveillance, and do these well, rather than attempting to spread itself thin over multiple tasks. Over the next short-medium term (five years), research, development and training could be outsourced (with guidance) to the CRCs who have the expertise, funding and governance structure in place. Activities would be closely aligned with AusBIOSEC priorities, and funded from agriculture, health and environment sectors. Direct links between AWHN, and ABIN and the CRCs should ensure high priorities are followed. After five years' time (when CRCs may be winding down) there could be a move to a nationally coordinated approach that does not involve the CRCs. The proven track record of the AWHN suggests this agency could expand and provide an effective cross-sectoral mechanism, but a transitional strategy would be needed to enable the expansion.

It was noted that planning for response to outbreaks was not covered by the models, nor was the issue of communications — whose role it is to get research into policy (although 'adoption' group meetings used in the AB CRC were briefly mentioned as a way for researchers to communicate with stakeholders).

It was also noted that uptake of research and recommendations is a key area not currently being addressed.

5. Final conclusions and recommendations

Question: 'From the last day and a half's discussions, what are the key points to include in a two- page cabinet submission on WEDPP and wildlife disease preparedness?'

There was a strong consensus that Australia should have a national body to ensure wildlife health is kept on the agenda, and that this body could be the AWHN or a development from the network (possibly with WEDPP involvement) if adequately resourced. Individual points made by the participants are listed in Appendix 3.

It was agreed that wildlife health is a crucial issue and if ignored there could be serious economic, environmental and social ramifications at a national or international level. Wildlife health is an emerging issue worldwide and there is a need for a cross-sectoral 'One Health' approach. Prevention of outbreaks is the most cost-effective method to deal with emerging and emergency diseases in wildlife, and significantly more support for research, training and implementation is needed. We need a better system in place to deal with disease incursions.

It was agreed there are clear and demonstrated benefits of having a national wildlife health program/ structure in place. Such a structure would have cross-sectoral support from health, agriculture and environment perspectives. A lead national body should be a decentralised structure with a whole-of-government collaboration between public and private agencies. It was emphasised that there must be suitable infrastructure in place to implement research recommendations into policy, to develop effective training practices and to ensure practical on-the-ground responses to a disease outbreak.

There was a strong consensus that Australia has the existing structure to deal with wildlife health issues, but it is currently fragile. It makes sense to make use of existing systems and capacity for risk mitigation, but they need to be significantly better resourced to be effective — currently a surprisingly small amount of money is invested in Australian wildlife health, probably because we have not had a serious outbreak to date (unlike New Zealand for example, where Tb is a huge concern, and millions of dollars are invested in wildlife research and management). AWHN and WEDPP should be continued with ongoing and increased funding and administrative support. One specific proposal was that the AWHN would need $5 million per year and approximately 25 staff to function effectively.

Workshop concluding comments — Chris Bunn expressed satisfaction with the workshop's organisation, process and outcomes. Participants said they would like a draft of the written proceedings to be sent to them for comment, and for the final document to be circulated to state chief veterinary officers, the WEDPP management committee and workshop participants.

It was concluded there was a clear positive consensus that an agency focussing on wildlife health issues should continue with strong support from federal and state governments, and with significantly increased funding.

The participants were thanked for their efforts in attending the workshop, and the workshop was officially closed.

References

Fleming, P. J. S., Tracey, J. P., and McLeod, S. R. (2006). Models of FMDV transmission in Australian feral goats and sheep. Proceedings of the 11th Symposium of the International Society for Veterinary Epidemiology and Economics, Cairns, Australia: ISVEE 11, 617-621.

Fleming, P. J. S. (2004). Relationships between feral goats (Capra hircus) and domestic sheep (Ovis aries) with reference to exotic disease transmission. PhD thesis (University of Canberra).

Henderson, W. R. (2008). Research on wildlife disease preparedness in Australia. Invasive Animals Cooperative Research Centre, Canberra. Available online at http://www.invasiveanimals.com/publications/downloads/Wildlife-disease-preparedness-FINAL-report-8-D-2.pdf

Kirkland, P. and Tracey, J. (2006). Detecting avian influenza in wild birds in New South Wales. Final report to Wildlife Exotic Disease Preparedness Program.

Nugent, G., Ramsey, D. and Caley, P. (2006). R-10627 – Enhanced early detection of Tb through use and integration of wildlife data into the national surveillance model. Landcare Research Contract Report: LC0506/167.

Acknowledgements

The author would like to sincerely thank all the attendees for their time and participation in the workshop. The assistance of Glen Saunders and Chris Bunn with organising the agenda is also greatly appreciated. The funding supplied by WEDPP for the workshop, and by individual agencies for participants' transport and accommodation is also acknowledged. Rupert Woods, Karrie Rose and Kathy Gibson are thanked for helpful comments on the draft report. Kerryn Molloy is thanked for the report cover design.

Appendix 1: Workshop attendees

Lisa Adams	Australian Biosecurity CRC Curtin Health Research Campus Blg 901 10 Selby St Shenton Park WA 6008	lisa.adams@abcrc.org.au
Cameron Bell	Disease Surveillance Department of Primary Industries Animal Standards Branch PO Box 2500 Bendigo Victoria 3554	Cameron.Bell@dpi.vic.gov.au
Mary Bomford	Bureau Rural Sciences Australian Department of Agriculture, Fisheries and Forestry GPO Box 858 Canberra ACT 2601	Mary.Bomford@brs.gov.au
Tony Bowland	Biodiversity Conservation Division Department of Natural Resources, Environment and the Arts P O Box 496, Palmerston Northern Territory 0831	Tony.Bowland@nt.gov.au
Chris Bunn	Manager Disease Preparedness and Domestic Office of the Chief Veterinary Officer Department of Agriculture, Fisheries and Forestry GPO Box 858 Canberra ACT 2601	Chris.Bunn@daff.gov.au
Peter Caley	National Centre for Epidemiology and Population Health ANU College of Medicine and Health Sciences Building 62, cnr Mills and Eggleston Rds The Australian National University ACT 0200	peter.caley@anu.edu.au
Brendan Cowled	Epidemiology and Modelling Section Office of the Chief Veterinary Officer Department of Agriculture, Fisheries and Forestry GPO Box 858 Canberra ACT 2601	Brendan.Cowled@daff.gov.au
Celia Dickason	Disease Surveillance PIRSA Animal Health PO Box 1571, Flaxley 5153 South Australia	dickason.celia@saugov.sa.gov.au

Anne Ferguson	Invasive Species Section Department of the Environment, Water, Heritage and the Arts PO Box 787 Canberra City ACT 2601	anne.ferguson@environment.gov.au
Hume Field	Biosecurity Sciences Laboratory Department of Primary Industries and Fisheries Queensland LMB 4 Moorooka Qld 4105	Hume.Field@dpi.qld.gov.au
Graeme Garner	Epidemiology Section Office of the Chief Veterinary Officer Department of Agriculture, Fisheries and Forestry GPO Box 858 Canberra ACT 2601	Graeme.Garner@daff.gov.au
Kathy Gibson	Office of the Chief Veterinary Officer Australian Department of Agriculture, Fisheries and Forestry GPO Box 858 Canberra ACT 2601	Kathy.Gibson@daff.gov.au
Leesa Haynes	Australian Wildlife Health Network PO Box 20 Mosman NSW 2088	lhaynes@zoo.nsw.gov.au
Wendy Henderson	Invasive Animals CRC Blg 3D3 University of Canberra Bruce ACT 2601	wendy.henderson@invasiveanimals.com
Lloyd Kingham (Facilitator)	Drought Support Worker & Weed Management Facilitator Wagga Wagga Agricultural Institute Pine Gully Road Wagga Wagga NSW 2650	lloyd.kingham@dpi.nsw.gov.au
Nigel Kirk	Invasive Species Section Department of the Environment, Water, Heritage and the Arts PO Box 787 Canberra City ACT 2601	nigel.kirk@environment.gov.au
Hamish McCallum	Devil Facial Tumour Disease Program School of Zoology University of Tasmania Private Bag 5 Hobart Tasmania 7001	hamish.mccallum@utas.edu.au
Steven McLeod	Vertebrate Pest Research Unit NSW Department of Primary Industries Forest Road Orange NSW 2800	steven.mcleod@dpi.nsw.gov.au

Clive McMahon	School for Environmental Research Charles Darwin University Casuarina Campus Darwin Northern Territory 0909	clive.mcmahon@cdu.edu.au
Jill Millan	Animal Biosecurity Biosecurity Australia GPO Box 858 Canberra ACT 2601	jill.millan@biosecurity.gov.au
Elaine Murphy	New Zealand Dept Conservation PO Box 13049 Christchurch 8141 New Zealand (also Invasive Animals CRC)	EMURPHY@doc.govt.nz
Graham Nugent	New Zealand Landcare Research PO Box 69 Lincoln Canterbury New Zealand	NugentG@LandcareResearch.co.nz
Bo Raphael	Bureau Rural Sciences Australian Department of Agriculture, Fisheries and Forestry GPO Box 858 Canberra ACT 2601	Bo.Raphael@brs.gov.au
Emma Rooke	Animal Biosecurity Biosecurity Australia GPO Box 858 Canberra ACT 2601	emma.rooke@biosecurity.gov.au
Karrie Rose	Taronga Zoo Australian Registry of Wildlife Health PO Box 20 Mosman NSW 2088	krose@zoo.nsw.gov.au
Glen Saunders	Vertebrate Pest Research Unit NSW Department of Primary Industries Forest Road Orange NSW 2800	glen.saunders@dpi.nsw.gov.au
John Tracey	Vertebrate Pest Research Unit NSW Department of Primary Industries Forest Road Orange NSW 2800	john.tracey@dpi.nsw.gov.au
Simone Warner	Microbiology Sub-Platform Biosciences Research Division Department of Primary Industries 475 Mickleham Rd Attwood, Victoria, 3049	simone.warner@dpi.vic.gov.au

Peter West	Vertebrate Pest Research Unit NSW Department of Primary Industries Forest Road Orange NSW 2800	peter.west@dpi.nsw.gov.au
Rupert Woods	Australian Wildlife Health Network PO Box 20 Mosman NSW 2088	RWoods@zoo.nsw.gov.au
Andrew Woolnough	Vertebrate Pest Research Section Department of Agriculture and Food 100 Bougainvillea Avenue Forrestfield Western Australia 6058	awoolnough@agric.wa.gov.au

Appendix 2: Workshop agenda

Day 1: Wednesday 2 April 2008

10:00 – 10:30 **Arrivals, morning tea**

10:30 – 11:00 **Welcome, introduction**

1. WEDPP role (national / international) and workshop aims — Chris Bunn (Wildlife Exotic Disease Preparedness Program, WEDPP)
2. Workshop structure and rules of engagement — Lloyd Kingham (Facilitator)

11:30 –12:30 **Technical review — current status of research**

1. Modelling wildlife diseases in Australia – Brendan Cowled (Office of the Chief Veterinary Officer)
2. Surveillance of high-risk disease areas (eg avian influenza in wild birds) — John Tracey (NSW Dept Primary Industries)
3. Understanding feral animal populations — Steven McLeod (NSW Dept Primary Industries)
4. Implications of disease transfer to, from, and within multiple wildlife hosts and livestock in New Zealand— Graham Nugent (Landcare New Zealand)

12:30 – 13:30 **Lunch**

13:30 – 14:00 **Technical review — impacts and priorities**

5. Impacts of disease in native fauna in Australia— Karrie Rose (Australian Registry of Wildlife Health)
6. National disease surveillance, and research priorities for wildlife — Rupert Woods (Australian Wildlife Health Network)

14:00 – 15:15 **Discussion and recommendations for future research directions**

Identification and validation of assumptions used in disease response, priority diseases, priority research areas

15:15 – 15:30 **Afternoon tea**

15:30 – 17:00 **Discussion and recommendations for future research directions (cont'd).**

19:00 – 22:00 **Dinner** – Thai Chiang Rai restaurant.

Day 2: Thursday 3 April 2008

8:45 – 9:00 **Arrivals, tea/coffee**

9:00 – 9:30 **Summary of Day 1, structure for Day 2** — Lloyd Kingham

Drew up SMEAC sheets for themes from previous afternoon's exercise.

9:30 – 10:00 **Training and preparedness**

1. AUSVETPLAN — Glen Saunders (NSW Dept Primary Industries)
2. Preparedness exercises — Chris Bunn and Brendan Cowled (DAFF)

10:00 – 11:00 **Discussion and recommendations for preparedness and training**

"What does WEDPP have to do to be ready for an outbreak this year?". Drew up SMEAC sheets for themes from this exercise.

11:00 – 11:20 **Morning tea**

11:20 – 11:50 **Infrastructure overview — policy and planning**

1. WEDPP structure and management, constraints — Chris Bunn (WEDPP)
2. Australian Wildlife Health Network overview — Rupert Woods

11:50 – 12:30 **Questions and discussion of management/infrastructure recommendations**

Analysis of processes, management/administration structure, funding arrangements, communications.

12:30 – 13:30 **Lunch**

13:30 – 14:45 **Final discussion**

"From the last day and a half, what are the key points to include in a two-page cabinet submission?"

14:45 – 15:15 **Workshop conclusion**

1. Concluding comments — Chris Bunn (WEDPP)
2. Workshop close — Lloyd Kingham (Facilitator)

15:15 –15:45 **Afternoon tea, departures.**

Appendix 3: Workshop notes

Discussion session 1 — Review of research

Priorities identified for future research included:

1. Prioritisation systems for funding and research — including a system/s to identify high risk diseases, potential wildlife pathogens, and species to be protected (discussion included whether human health should be a factor in prioritising diseases)

   There was much discussion in the following list about whether human health should be a factor in prioritising diseases, and some comment about separating human health, production, and environmental diseases to each have their own priority systems. Points included the need for:

   - Prioritisation of systems to make funding decisions transparent
   - A prioritisation system to determine what the most important diseases are and their risks to environment and primary production
   - A system of prioritisation of potential wildlife pathogens, providing a priority listing of diseases
   - A risk assessment framework to prioritise research
   - Addressing the question 'What is the risk posed by wildlife and how can it be identified, assessed and managed?'
   - Risk identification and management for everything with wildlife associated (including human health)
     - Threat identification
     - Threat assessment
     - Threat mitigation
   - Prioritising species listed as key threatening processes under the Environment Protection and Biodiversity Conservation Act 1999 and with threat abatement plans
     - chytrid
     - beak and feather disease
   - Prioritising wildlife diseases that impact on human health.

2. Emerging diseases in wildlife.

3. Disease impacts on native fauna, whether the disease is exotic, or an emerging endemic:

   - What are the most important exotic diseases for native fauna?
     - Level of threat
     - Which disease?
     - Which species/ taxonomic group?
   - Priority to save Australia's frogs, Tasmanian devils and woylies.

4. Ecosystem health:

   - Define specific indicators of ecosystem health (eg. what has to change and by how much before we start to worry?) That is, define 'normal' so as to identify 'abnormal' aspects of ecosystem health.

5. Bat virus research:

   - Bat viruses (henipa and Australian bat lyssavirus), especially their link with landuse change, increasing urbanisation / new primary industries / and climate change. Also, there is a need to understand the difficulties of disease control due to involvement of threatened species as reservoir hosts.
   - Drivers for spillover of henipavirus.

6. Environmental change and wildlife disease:

   - Ecotoxicology such as botulism, blue green algae and marine biotoxins
   - Climate change and wildlife disease
     - Decrease in biodiversity
     - Increase in ferals
     - Increase in arboviruses / vectors
   - Climate change and its effect on wildlife diseases
   - Impact of climate change on disease emergence
   - Effect of climate change on distribution and occurrence of diseases (eg. arbovirus / Japanese encephalitis / bluetongue disease / Murray Valley Encephalitis)
   - Diseases of wildlife that have insect vectors should be a priority — climate change and management factors make these difficult to control.

7. Research into disease ecologies:

   - Research into ecology of wildlife diseases with important human, livestock or environmental effects. Research should focus on the information needed to enhance surveillance and preparedness.
   - Mapping the diversity of coronaviruses in Australian bats
   - Ecology of avian influenza viruses
   - Wildlife / animal ecology (participants could see a sequential effect from disease ecology to modelling, so wildlife / animal ecology should be included in ecology research).

8. Modelling priorities:

   - Improved models on vectors' spread of high priority diseases, including wildlife population models
   - Transmission routes and spatial parameters
   - Fieldwork on contact rates between wild animals and between wild animals and domestic animals to improve disease spread models
   - Modelling behaviour of FMD and classical swine fever in feral pigs
   - Optimal strategies to manage multihost infections (which species to manage?).

9. Identify high-risk areas for disease outbreaks.

10. Ensure information systems can be shared.

11. Surveillance priorities:

    - Develop and test a national surveillance strategy for key wildlife diseases, prioritise key wildlife species and diseases to research.
    - Develop methods for syndromic surveillance (surveillance using health-related data that precede diagnosis and signal a sufficient probability of a case or an outbreak to warrant further response).
    - Determine detection capabilities (technical) for highest priority diseases that are currently absent.
    - Determine disease survey efficacy (ie. resolve the issues of 'absence of evidence' versus 'evidence of absence').

12. Infrastructure to support critical success factors for wildlife disease investigation and management.

13. Protocols for release of rehabilitated wildlife (possibly also a training requirement).

Discussion session 2 – Review of training and preparedness exercises

Individual points made during this discussion centred on reviewing knowledge, defining people's roles and responsibilities, training, and information issues.

Review current knowledge and update where necessary:

- Review Australia's capability to respond to emergency disease in wildlife, including staff, knowledge, legislation and resources.
- Conduct a technical review of WARS.
- Check out applicability of other disease response models — eg from New Zealand's response program for exotic diseases of animals (at http://www.biosecurity.govt.nz/pests-diseases/animals/exotic-disease-response.htm)
- Address the key questions 'How do we report, how do we respond to a disease event in wildlife?' — develop a process.
- Be flexible to different situations.
- Gather existing information to update AUSVETPLAN etc— eg from equine influenza outbreak.
- Gather existing information on distribution, abundance and movements of potential disease hosts.

Register, roles and responsibilities:

- Re-establish the expert list in Australia based on skills and training in emergency disease.
- Develop and update skills register.
- Have clear roles and responsibilities and communication.

- Clarify responsibilities for disease investigations — eg via a Wildlife Emergency Investigation Team.
- Improve interagency communication flow (and appropriate public relations).
- Be able to articulate (and change if necessary) underlying model of EPBC Act.

Training:

- Train the trainer in field response (using a multidisciplined approach).
- Conduct rapid training for immediate capacity building.
- Run a multi-level, desktop exercise to identify gaps in disease response.
- Have an integrated national training plan.
- Run more training at all levels on disease observation, reporting, diagnosis and response.
- Develop a training course for wildlife officer roles in an emergency. Have a dedicated wildlife role for all emergency desktop exercises.
- Use WARS in exercises/ training — we need integration and understanding of wildlife and pest data.

Information needs:

- Develop an accessible database — eg GIS information on hosts.
- Have a library of maps/ GIS data of wildlife and feral animal densities and locations.
- Provide clear guidance on animal welfare (a standards code).

Other:

- Identify a pool of money for disease investigations.
- Investigate whether there are laboratory tests for the diseases of interest, who has them, and whether they are valid for use in wildlife.

Discussion session 3 – Points for a cabinet submission on WEDPP

Individual points to include in a cabinet submission on WEDPP were:

General points — importance of wildlife health:

- Wildlife health is an emerging issue worldwide.
- Emerging infectious diseases are increasing with climate change, people and product movements, land use changes.
- Wildlife health is a critical part of ecosystem health.
- There is a need for a 'one world, one health' approach that is multidisciplinary (involving stakeholders from environment, health and agriculture).
- We need to consider Australia's international obligations with respect to wildlife health (impacts on trade, biosecurity).
- Prevention of disease outbreaks is the most cost-effective method. We need a national early warning, surveillance system in place. If wildlife health slipped through the current health/ trade/ environment system, the social, economic and environmental implications of wildlife disease could be enormous.

- Emerging disease is unmanageable unless it is handled quickly. There is a need to invest in monitoring and increase capacity for rapid response.
- We should note the importance of wildlife as sentinels and indicators for human health (eg Esperance mass bird mortalities)

General points — need for a national agency for wildlife health:

- It is imperative to have a lead agency/ construct in wildlife health.
- Cooperative federalism should be advocated: a decentralised structure is needed involving a whole-of-government collaboration between public and private agencies — involving states in meaningful and practical ways is critical.
- There is a need to develop a national wildlife health system to support Australia's trade, human health, biodiversity and tourism - there are clear and demonstrated benefits of having a national wildlife health program/ structure in place.
- A wildlife health network/ program is supported by a wide range of stakeholders — wildlife health is a nationally important issue.

In support of WEDPP/ AWHN specifically:

- More funding is required for wildlife exotic and emerging disease preparedness to ensure Australia has the capacity to respond to an emergency disease outbreak. We have the existing structure to deal with wildlife health issues, but it is fragile and in need of ongoing and increased support. It makes sense to make use of existing systems and capacity.
- AWHN has experience, a proven track record and contemporary awareness that should be embraced.
- A national wildlife health body such as the AWHN would need $5 million per year and approximately 25 staff to function effectively.
- WEDPP is the key body to facilitate research and training in disease preparedness in Australia. It must continue to be supported as a risk mitigation strategy.

Workshop Proceedings: Review of wildlife exotic disease preparedness in Australia 2008

Invasive Animals Cooperative Research Centre
University of Canberra
Kirinari Street
BRUCE ACT 2617
Phone: +61 2 6201 2890
Fax: +61 2 6201 2532
Email: contact@invasiveanimals.com
Web: www.invasiveanimals.com