Workshop Proceedings: Risk assessment processes for import and keeping of exotic vertebrates in Australia

Canberra, February 2009

Compiled by Wendy Henderson

Invasive Animals CRC

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Risk assessment processes for import and keeping of exotic vertebrates in Australia

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Hosted by the Invasive Animals Cooperative Research Centre

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COOPERATIVE RESEARCH CENTRES ASSOCIATION

Invasive Animals Cooperative Research Centre

Workshop Proceedings: Risk assessment processes for import and keeping of exotic vertebrates in Australia.

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Contents

Summary

This report summarises the proceedings of a workshop that reviewed government risk assessment processes for the import and keeping of exotic vertebrates in Australia. The workshop was held by the Invasive Animals Cooperative Research Centre (IA CRC) on 25–26 February 2009 in Canberra.

The workshop's primary aim was to produce recommendations for an improved system for regulating the import and keeping of exotic animals in Australia, to ensure we are adequately protected from new pest incursions.

Representatives attended from the Australian Government Department of the Environment, Water, Heritage and the Arts (DEWHA; from Exotic Species Regulation and Environmental Biosecurity) and Department of Agriculture, Fisheries and Forestry (from Bureau of Rural Sciences, Biosecurity Australia and Sustainable Resource Management). Representatives from each state and territory government attended from agriculture/primary industry and environment portfolios. Participants also included members of the Vertebrate Pests Committee (VPC), Murray–Darling Basin Authority, Australasian Regional Association of Zoological Parks and Aquaria, and the IA CRC. New Zealand's Department of Conservation and Environmental Risk Management Authority were also represented.

The group acknowledged that there are substantially different approaches used by different jurisdictions for assessing risks of animals proposed for import. These differences cause inefficiencies, inadequacies and confusion in risk assessment processes. Participants did not dwell on the specific differences but rather on how to develop a nationally agreed approach. The two top priority issues identified were: essential elements of risk assessments for proposed imports, and managing high-risk species already in Australia.

Questions and doubts were raised concerning transparency and robustness of the live import process, and of the containment and auditing of high-risk animals. The group acknowledged there are difficulties associated with separation of powers, clarity of roles, and impacts of input from different agencies and lobby groups. Discussions included the success or failure of past and present strategies, strategies used to deal with weeds and strategies used by New Zealand.

The participants acknowledged DEWHA's recent improvements in consultation processes for importing exotic species and recommended further refinements to aid in communication between all stakeholders. The forum also recommended moving towards harmonising exotic species policies and supporting legislation.

The key recommendations of the workshop include a:

- nationally agreed approach for
    - a single risk assessment system, each species assessed once, by accredited, independent assessors paid for by the applicant
    - levels of security needed for assigned threat categories
    - standards for secure facilities and auditing of these facilities
- review and consolidation of information on exotic vertebrates within Australia
- review of existing education packages and a rollout of revised packages in a communication campaign as a component of the Australian Pest Animal Strategy.

Abbreviations and acronyms

ALOP	appropriate level of protection
AQIS	Australian Quarantine and Inspection Service
ARAZPA	Australasian Regional Association of Zoological Parks and Aquaria
AusBIOSEC	Australian Biosecurity System for Primary Production and the Environment
BA	Biosecurity Australia
BRS	Bureau of Rural Sciences
CITES	Convention on International Trade in Endangered Species of Fauna and Flora
DAFF	Australian Department of Agriculture, Fisheries and Forestry
DEWHA	Australian Department of the Environment, Water, Heritage and the Arts
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERMA	Environmental Risk Management Authority (New Zealand)
IA CRC	Invasive Animals Cooperative Research Centre
IGA	intergovernmental agreement
NRMMC	Natural Resources Management Ministerial Council
RA	risk assessment
VPC	Vertebrate Pests Committee

1. Introduction

Many exotic species are kept and bred in captivity in Australia and New Zealand as companion or hobby animals, or for their commercial or conservation benefits. In Australia, at least 25 mammals, 31 freshwater fish, 20 birds, four reptiles and one amphibian have established populations in the wild after accidental or intentional release into the environment. Many of these introduced species are now pests, having adverse impacts on agriculture and the environment. To avoid future incursions, it is essential to have robust risk assessment and regulatory processes in place at the pre-import stage. It is also important that animals that have been imported are kept in Australia at appropriate levels of containment and that interstate movement is regulated.

This risk assessment (RA) workshop was held by the Invasive Animals Cooperative Research Centre (IA CRC) in Canberra on 25–26 February 2009. From the IA CRC's perspective, the workshop was held to address the CRC's goal of: 'Reduced risks of economic losses, environmental damage and social stress by forecasting and responding to potential, new or emerging invasive animal problems'.

The workshop was considered to be timely, given the recent submission of the Beale Biosecurity review[1]; the current review of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); and the recent establishment by the Vertebrate Pests Committee (VPC) of an Exotic Animals Working Group (likely to have a watching brief on the Beale review). Several jurisdictions are also currently developing or reviewing their biosecurity strategies.

In this context, key recommendations of the Beale report are to:

- establish a new national authority that brings together the major functions of Biosecurity Australia (BA); the Australian Quarantine and Inspection Service (AQIS) and parts of the Department of Agriculture, Fisheries and Forestry (DAFF)
- establish a new biosecurity standards commission to assess the biosecurity risk of imports, with greater emphasis on risks to human health and the environment
- develop new biosecurity legislation to replace the *Quarantine Act*
- establish a new council of experts to advise government
- improve coordination between states, territories, industry and the Australian Government to better monitor biosecurity issues/risks post border.

The independent review of the EPBC Act is currently underway and is expected to be finished by end October 2009. Public submissions to the review closed in December 2008, although comment will be invited on an interim report scheduled for June 2009. A Senate Standing Committee on the Environment, Communication and the Art's inquiry into the operation of the EPBC Act recently issued its first report[2], recommending that:

> … the government give urgent consideration to increasing the resources available to the department in the areas of assessment, monitoring, complaint investigation, compliance, auditing projects … and enforcement action.

A variety of professionals attended the workshop from every state, including technical officers involved in risk assessments and tool development, policy makers and managers, and zoo/aquarium industry representatives. State, territory and Australian Government departments of agriculture and environment were represented, as were the Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA), Murray–Darling Basin Authority, the IA CRC, and New Zealand's Environmental Risk Management Authority and Department of Conservation. Two members of the VPC were included in the group. (Representatives from NSW Department of Environment and Climate Change and ACT Department of Territory and Municipal Services were also invited but were unable to attend.) Participants agreed at the start of the workshop that its outcomes would feed into the implementation of the Beale report recommendations, the EPBC Act review and jurisdictional biosecurity strategies.

1: See http://daff.gov.au/__data/assets/pdf_file/0010/931609/report-single.pdf (accessed: April 2009)

2: The Standing Committee on Environment, Communications and the Arts first report on The Operation of the EPBC Act is available at http://www.aph.gov.au/senate/committee/eca_ctte/epbc_act/report/report.pdf (accessed: April 2009)

1.1 Aims

The workshop's primary aim was to produce recommendations for an improved system for regulating the import and keeping of exotic animals in Australia, to ensure we are adequately protected from new pest incursions.

The workshop aimed to assess current state, territory and Australian government risk assessment processes and determine whether:

- there are gaps, constraints, inefficiencies or potential sources of bias or uncertainty that can be improved
- processes are sufficiently transparent
- a more standardised, national approach could be adopted.

1.2 Structure of the workshop

Workshop attendees are listed in Appendix 1. The agenda for the workshop is provided in Appendix 2.

The workshop focused on processes used by governments in assessing the risks of exotic vertebrates proposed for import (into Australia or from one state to another) and keeping. Scientific approaches, information tools, risk policies and consultation processes were included.

A table outlining six key issues/problems was circulated to participants before the workshop, to prioritise what the workshop would focus on (see Appendix 3). Participants were asked to rank the issues listed according to the problem's complexity, whether the workshop could practically resolve it, consequences of ignoring the problem, and the likelihood it was already being worked on elsewhere.

Based on participants' prioritisation of issues, the workshop was divided into five main sessions:

- presentations from invited speakers (Section 2)
- essential elements of risk assessments (Section 3)
- managing high-risk species already in Australia (Section 4)
- other high-ranking issues — import of hybrids, developing a national database and determining an appropriate level of protection (ALOP) (Section 5)
- final recommendations (Section 6).

Presentations included outcomes of a key meeting between the Australian Department of the Environment, Water, Heritage and the Arts (DEWHA) and state governments in August 2008 on the live import process. Other presentations were on the use of scientific models for RA, and New Zealand's approach to RA with regards to import of new organisms. Climate matching and Excel software tools for RA were demonstrated. Summaries of each talk are provided below (Section 2).

Workshop discussions were structured by asking participants to write three individual thoughts on self-adhesive notes, which were then placed on a wall. These notes were sorted by the whole group into lists of similar themes. Small groups then developed recommendations for priority themes by outlining a current situation/issue, suggesting a mission to remedy the issue, providing options to achieve the mission (execution), and recommending parties to administer/fund it.

2. Presentations

2.1 Summary of DEWHA/states meeting — Bernadette Oakes (DEWHA)

Pre-workshop handouts included full minutes from the Commonwealth/states meeting of August 2008. The focus of this meeting was on live animal import controls, including:

- the EPBC Act live import process and requirements for environment assessments
- analysis undertaken by DEWHA, including use of scientific RA models
- the opportunity to improve state and territory consultation
- a national approach and context to live imports.

The group discussed whether the EPBC Act could be improved through better liaison with state/territory jurisdictions, better policy and/or better legislation. Whether RA tools and science could be improved was also discussed. States indicated they would like a more transparent, integrated and nationally based approach to live imports. Key proposed outcomes for the meeting were to:

- ensure there is a sound understanding of the EPBC Act live import process and how DEWHA operates within the Act
- establish networks and strong partnerships with states and territories, aiming to improve consultation
- develop approaches to address the import control of hybrid species.

DEWHA has agreed to improve feedback and consult with the states and territories on the risk assessment and mitigation options, and provide information following the minister's decision on how state comments were considered. To this end, a secure GovDex website and a contact list of assessors and senior executive officers have been developed. DEWHA expects to post applications and preliminary RAs on the GovDex site for review and comments. Jurisdictional RAs and comments will also be posted on the site. Amendments will then be available for further comment before a final recommendation is made to the minister.

Workshop participants were invited to contact the department to gain access to the site.

DEWHA and Bureau of Rural Sciences (BRS) have undertaken to test the new RA models Excel tool based on the Bomford models (see below). The Western Australia Department of Agriculture and Food has also expressed interest in trialling the tool. Once it appears to provide consistent results, DEWHA plans to make the tool available to all states and territories.

Another recent development relevant to the workshop is the completion of the Beale review of biosecurity and quarantine. It has recommended the establishment of a single Commonwealth agency (a National Biosecurity Authority) to deal with biosecurity matters. The new agency should have pre-border, border and post-border roles. Greater emphasis should be placed on risks to human health and the environment. A new Biosecurity Act has also been recommended to combine elements of the EPBC Act and Biosecurity Australia's import risk assessment process.

The EPBC Act is currently under independent review by Dr Allen Hawke and a panel of experts. Two key aspects being reviewed are whether the legislation allows us to protect the environment and whether current assessment and decision-making processes for listing specimens suitable for live import could be refined or simplified. Whether assessments should consider social and economic issues is also being considered.

2.2 Scientific models for risk assessment — Dr Mary Bomford (IA CRC)

Escaped pets are a major source of new exotic populations. Yet demand for exotic species as pets is increasing and includes many potentially invasive species, especially fish and birds. In theory, science-based risk assessments can enable the import of low-risk species, whilst identifying and excluding high-risk species. Yet how such risks can be assessed is still a matter for scientific debate.

The risk assessment process

The risk assessment process can be broken down into the following five steps, which are discussed below:

1. How does the species get into the country?
2. How does the species get released?
3. If released, will the species establish a wild population?
4. If established, can the species be eradicated?
5. If not eradicated, how much harm will the species cause?

Possible routes for a species to enter Australia include smuggling, legal import (for captive keeping) and accidental import (eg as stowaway on imported cargo).

Possible routes for a species to be released into the environment include: as a biological control agent, as an agricultural production species, through accidental escape or intentional illegal release. Release of aquarium fish is the main pathway for exotic fish establishment in Australia, with 19 of the last 21 fish species that have established originating from the aquarium trade. We are averaging two new species of exotic fish per year establishing in Australia. People are often reluctant to kill unwanted aquarium fish and prefer to release them.

If released, what determines whether a species will establish a wild population? Ecologists have tested a large number of attributes in search of criteria that are consistently associated with establishment success. They compare species that have established wild populations with other species that were released but failed to establish wild populations. To date, there have been over a dozen such studies on introduced birds to various countries (see for example Cassey et al 2004, Hayes and Barry 2008). There have been two studies on mammals (Forsyth et al 2004, Bomford et al in press), four on freshwater fish (see Hayes and Barry 2008) and one on reptiles and amphibians (Bomford et al 2009). There have also been a couple of review papers attempting to identify common findings from all these studies. The results have been used to develop various models for assessing the risk that new species could establish wild populations if they are released.

There is a major constraint operating for all of these studies; namely, small and biased samples. This has meant that the results are not clear cut or scientifically robust. This constraint has major implications for risk assessments. It means that the science does not yet exist to underpin mechanistic, objective risk assessment models that can be relied on to give correct predictions for all species.

By far the strongest factor influencing the chances of a species establishing in the wild is the number of release events and the numbers of individuals released. If there are enough release events, almost any species will establish in the wild. Therefore, allowing unregulated keeping, breeding and trade of exotic species will greatly enhance the risk of new species establishing, because this will drive up the number of releases that occur. A second factor that is strongly and consistently associated with a species establishment success is having a history of being

successful elsewhere. A third factor strongly associated with establishment success is having a good climate/or habitat match between where species occurs and where it is introduced. These three factors have all been consistently demonstrated to increase the chances of establishment for all vertebrate taxa.

There are also a range of species-level attributes that have been associated with establishment success in various studies, but none of these are consistent across all vertebrate taxa, and scientific evidence supporting these factors is weaker (Hayes and Barry 2008). Examples include being non-migratory, having a large brain, being a dietary generalist and having a high reproductive output. Because these species-level attributes vary between taxa it would be very difficult to make one model applicable to all groups.

Once a species is established, can the species be eradicated? Success of eradication depends on factors such as whether the species can be detected and removed at low densities, what area is infested and whether non-target species are affected by control methods. The level of public opposition and costs involved are also major factors.

Eradication will almost certainly be unachievable if a species is hard to detect and remove at low densities. Attempting eradication is usually extremely expensive. Small aquatic species are probably the hardest to eradicate — unless they occur in closed isolated waterways. So, once such species are established it is pretty well irreversible. Recent incursions of red-eared sliders in several states and aquarium fish are telling examples. Preventing release is a far less risky and more cost-effective approach to managing the risk than attempting eradication.

If not eradicated, how much harm will the species cause? Factors affecting harm include predation, competition, changes to habitats and food webs and genetic changes. If species cause damage to agriculture and have the ability to spread disease, these attributes also increase the potential of it causing harm.

While assessing the risk of establishment is scientifically challenging, predicting potential damage is far more so. When species establish in a new environment, they can cause major disruptions to ecosystems. For example, in Lake Victoria, Africa, the introduced predatory Nile perch (*Lates nilotica*) caused the extinction over 200 species of native cichlid fish species (Welcomme 1988). Often introduced species reach far higher densities in their introduced range than ever occur in their native range. Birds introduced to New Zealand have average population densities 22 times higher than in their native range in Europe (McLeod 2009). There are similar reports of introduced frogs reaching densities at least ten-fold higher that in their native range (Kraus et al 1999).

The effects of an invasion can cascade through an entire ecosystem, altering native species diversity and composition at all trophic levels. There can be secondary impacts due to changes in nutrient cycling and habitat structure, altering fundamental ecosystem processes. Identifying species that can cause ecological harm is inevitably a subjective process. Ecological harm is difficult to define and expensive to evaluate, especially when it involves competition with native species or impacts on community structures and ecosystem processes. Few such expensive studies have been conducted, especially for fish, reptiles and amphibians. So, just because there is no published information on the harm caused by a species, this should never be grounds to conclude harm is not caused. There is no universally agreed formula to measure the environmental harm caused by introduced species and hence opinions on the type, extent and significance of impacts vary and even conflict. What's more, this is for species that have already established. It is far more difficult to attempt to predict what may happen if new species establish.

Factors that may increase a species' risk of harm (with the caveat that an absence of these factors cannot be taken to indicate that there is a low risk of harm) include:

- having adverse impacts elsewhere
- having close relatives with similar behavioural and ecological strategies that have had adverse impacts elsewhere
- being generalist feeders
- being predatory
- having potential to destroy or modify vegetation or otherwise disturb habitats
- having potential to cause physical injury
- using tree holes (leading to competition with other tree dwellers)
- harbouring or transmitting diseases or parasites that are present in Australia
- having close relatives among Australia's endemic species (possibility of forming hybrids)
- being known to have spread rapidly following their release into new environments.

Quantifying these risks is extremely difficult.

Limitations of risk assessments for introduced vertebrates

A risk assessment cannot give a rock-solid prediction on whether or not an introduced exotic species will establish and if it does what impact it will have. The best that can be achieved is to give an estimate of (i) the likelihood that a species will establish and (ii) its potential to cause harm. There is always uncertainty in risk assessments and these can be divided into three types (Aquatic Nuisance Species Taskforce 1996):

1. Uncertainty of the process (methods)
2. Uncertainty of the assessor (human error)
3. Uncertainty about the organism (biological and environmental unknowns).

The goal is to reduce these three levels of uncertainty as much as possible.

Uncertainty of the process (methods)

Basing the risk assessment modeling on robust scientific knowledge and statistical analyses of past introductions will do much to minimise the first source of uncertainty. That said, when scientific analyses are done on large, unbiased samples, with rigorous statistical analyses, the results are robust. An example can be found in the clinical trials conducted on new pharmaceutical drugs. For exotic vertebrates, the samples are small and biased, hence the statistical analyses can't be rigorous, and the resulting models are not robust. So it is desirable to have qualitative assessments as well as quantitative modeling when conducting risk assessments.

Uncertainty of the assessor

There are two components to this type of uncertainty which need to be addressed: appropriate expertise and independence.

Appropriate expertise — Some of the information used in performing a risk assessment is scientifically defensible, some of it is anecdotal or based on experience, and all of it is subject to the filter of perception. Hence all risk assessments contain a subjective component and risk assessments, no matter how objective the selection criteria, are dependent for accuracy and consistency on the skill and thoroughness of the assessor. This means the risk assessments must be conducted by wildlife ecologists with the appropriate expertise to make good judgments about which data to use and how to interpret it. The models will give unreliable outputs if used by operators who lack appropriate expertise. Assessing a species is more akin to writing a

research thesis than following an instruction manual. Every species will be different. This is where vertebrate risk assessments are completely different from clinical trials of pharmaceutical drugs — the latter is an objective, mechanistic statistically robust process.

Retrieving critical information about the spread, impact and control of invasive species is difficult because much of this information is buried in disciplinary journals from many different fields or in grey literature that is hard to access. Additional information is only known to ecologists who work on the exotic species in its country of origin. This makes it imperative that those who conduct risk assessments have the skills, time and financial resources to access it and the expertise to evaluate it.

A quick example illustrates this point. New Zealand imported live channel catfish eggs for aquaculture following an assessment of this species. But then an independent review team contacted ecologists who had studied channel catfish where they had been released in California. In California, the channel catfish wiped out native species it came into contact with and also preyed on commercial fish species such as salmon and trout. Luckily for New Zealand, the channel catfish were still in quarantine there and they were subsequently destroyed.

Independence — The other key factor is that the assessor has to be completely independent. The models cannot give reliable outputs if used by operators who have a vested interest in the outcome, because that vested interest will compromise their judgment and their ability to impartially and independently evaluate evidence. If the assessor is employed by the applicant, there is a clear conflict of interest, and any results will be compromised. Also, stakeholders are, by definition, people who have a stake in the outcome and are not independent. Therefore zoo keepers, pet industry representatives and other stakeholders should not have any input into the risk assessment process.

Risk managers (ie government bureaucrats), should not attempt to influence the outcome of any assessment, and should ensure that those conducting assessments are free from any pressures or motives that might influence the outcome.

Changing the presentation of risk assessment models, for example by presenting them in an Excel spreadsheet format (or any other format) cannot alter this requirement for independent, expert operators. This is true for all risk assessment models for exotic vertebrates because all of them are based on analyses of small and biased samples. And the qualitative component of the risk assessments is subjective.

Unless we were to introduce hundreds of exotic vertebrates outside their native range and monitor the consequences so we could build more robust, statistically validated models, this limitation of the models is not going to change.

Uncertainty about the organism (biological and environmental unknowns)

Ensuring appropriately skilled experts with the time and financial resources to conduct risk assessments will reduce this third source of error. However, where there is little biological data available for a species, this source of uncertainty will be high. Lack of 'demonstrated risk' due to lack of supporting biological data should never be used as grounds to justify the import of a species. A precautionary approach is required for all such species.

Decision/consultation process

It is appropriate and desirable to obtain and consider political, economic and stakeholder input into a decision about the import and keeping of exotic species. However, this process must be kept separate from the scientific risk assessment. Mitigating factors, national benefits/risks of importing/keeping the species, and acceptable levels of risk are all valid areas where stakeholders can and should have an input. For example, no risk assessment model can

determine what an acceptable risk level is. This depends on value judgments that are beyond the systematic evaluation of information and here Bayesian and multi-criteria decision analysis (MCDA) approaches may prove useful.

It is vitally important for the integrity of the process that regulatory agencies take steps to establish and maintain a clear distinction between the risk assessment process conducted by independent scientists and the consideration of risk management alternatives which should involve stakeholders and political and economic considerations.

The meeting hosted by DEWHA last August made it clear that there are areas of shared concern about the processes currently used for risk assessment that apply at both federal and state/territory levels. This workshop is an opportunity to address at least some of these shared concerns.

Key messages

- All the RA models have limited predictive power and this is not going to change in the foreseeable future.
- There is a need for both quantitative models and qualitative expert assessments to get reliable results.
- Only independent experts are capable of doing reliable risk assessments.
- Ecological impacts are difficult and expensive to measure and there are few such studies — but lack of reported harm does not mean harm does not occur. We need to take a precautionary approach.
- Eradication is not a good option — it is expensive and likely to fail.
- New species are still establishing — the best way to reduce risk is to restrict numbers of species being kept.
- Look at the national interest when making decisions — who gains and who risks losing.

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2.3 'New organisms': Managing the deliberate importation of vertebrates into New Zealand — Dr Geoff Ridley (ERMANZ)

Since 1769, a huge range of plants and animals have been deliberately introduced to New Zealand. Plants were introduced for the 'gardening' of New Zealand, and birds and mammals for 'gentrification' of the countryside. Many of these introductions have become pests: the possum is a classic example. In 1996, the *Hazardous Substances and New Organisms* (HSNO) *Act* turned New Zealand's approach to new species around. While the HSNO Act deals with deliberate introductions, the *Biosecurity Act* deals with inadvertent introductions and the *Resource Management Act* deals with how an organism will be used.

All species that meet the definition of 'new organism' are considered to be a hazard until proven otherwise through risk assessment. An important feature of the HSNO Act is that the decision to approve or decline the introduction of an organism is based on the beneficial effects of the organism weighed against the adverse effects. The nature of beneficial and adverse effects to the environment, to the health and safety of people, to societies and communities, to the economy, and on Maori culture are considered. A precautionary approach is used: there is a need for caution where there is scientific uncertainty about those effects.

An applicant must be declined if they cannot meet minimum standards. This is done on a case-by-case assessment and requires a value judgement. An application must be declined if the species causes significant:

- displacement of native species
- deterioration of natural habitats
- adverse effects on human health and safety
- adverse effects on New Zealand's inherent genetic diversity
- disease.

Any species not present in New Zealand on 29 July 1998 is declared a new organism. This definition does not include species that are widely established (naturalised) or captive species (eg sheep, budgies). Species in containment only (eg in zoos, circuses or laboratories) are considered new. There is still no list of all the new species in New Zealand based on this definition.

The HSNO Act contains a Prohibited list, which includes all snakes and other venomous vertebrates, foxes, cane toads, two families of marsupial. Such species cannot be considered for import under any circumstances. To import an animal for containment, the importer is charged a fee (NZ$2,250 or NZ$11,250 if the public is notified of the import). Local Maori are involved in consultation but in general there is no public consultation. Importations and transfer can only be into a registered containment facility standard — it must have an operating manual and be subject to auditing (at the facility's cost). If approved for containment, the species remains a new organism. Controls are imposed on the keeping of the species — risks must be mitigated, the mitigations must be achievable, enforceable and cost effective. Having gained confidence in the system of containment and auditing, risk assessments are now being done in groups of species, based on similar characteristics (particularly how they could escape). Examples include large cats, dogs and marsupials. This approach saves considerable time and effort.

For import for environmental release with controls, a fee is negotiated, there is national Maori consultation and public notification. A call for submissions is made, with a public hearing if requested. If approved, the species remains a new organism. As before, controls imposed must mitigate risk and be achievable, enforceable and cost effective.

For import for release without controls, a fee of NZ$33,750 is charged. This tends to deter most hobbyists wanting to import a pet, for example. There is national Maori consultation, public notification and a call for submissions, with a public hearing if requested. If approved, the species is no longer considered a new organism. Only insects for use as biological control agents have been approved in this category to date.

A subset of releases without control may be assessed using a rapid assessment process (costing about NZ$560). In this case, there is national Maori consultation but no public notification or call for submissions. Only plants have undergone this process so far. To be eligible for a rapid assessment, it must be highly improbable that the organism, after release, could form self-sustaining populations anywhere in New Zealand (taking into account the ease of eradication), or cause significant displacement, deterioration, disease or harm to human health or the environment (as listed above).

> Overall the approach taken by New Zealand is conservative, with no vertebrates being approved for import to date, except to high-security facilities that are audited for compliance.

It was noted that illegal trade or movement of species within New Zealand tends to be noticed due to the small size of the country.

2.4 Climatch web software — Joe Crombie (BRS)

Climatch is a web-based tool for climate matching developed by BRS (funded by the IA CRC), based on the PC software Climate currently used in risk assessments. Climate matching — using rainfall and temperature parameters to help predict where a species may establish — is one important predictor of the likelihood that an introduced species will establish and spread. Other important predictors are the history of invasive success and the number of arriving/released individuals (Hayes and Barry 2008).

There are a number of different techniques to match climates. These include genetic algorithms, machine learning, regression-based modelling, distance-based methods and climate envelope methods. In general, the more complex techniques can account best for the ecology of invasive species and are likely to provide the most accurate results; the simpler techniques require less data and often give comparable results to those derived using complex models. Climatch implements the Climate algorithm which is simple, repeatable and readily calculated, and is therefore the agreed model for sharing the costs of a response to an invasion under the AusBiosec agreement. The Climate algorithm is a distance approach, where sources of climate information are represented as points in multidimensional space. A measure of 'distance' between the points is calculated, and a match score is assigned based on these calculated distances.

A tutorial guide is available online with Climatch. At the workshop, participants were shown how to choose source and target regions to match climates, understand the outputs produced, and post-process the results with RAmodels (see following).

> Climatch is available online at http://www.brs.gov.au/Climatch

Reference

Hayes KR and Barry SC (2008). Are there any consistent predictors of invasion success? *Biological Invasions* 10:483–506.

2.5 Excel tool RAmodels — Dr Greg Hood (BRS)

RAmodels is an Excel application developed by BRS and DEWHA. It allows collation of RA data relevant to the Bomford models (2003, 2006, 2009).

It calculates scores according to the full Bomford 2009 report *Risk Assessment Models for Establishment of Exotic Vertebrates in Australia and New Zealand*.

It also imports and stores Climatch files (both input and output). The tool is expected to improve consistency between different model users and to provide ready access to background information. For example, it can show cost-sharing amounts for each state (costs of eradication broken down state by state) based on the outcomes of the RA.

RAmodels is now available free to all government agencies.

Following a brief demonstration of RAmodels, a comment was made that it would be very useful to have a Microsoft Word version, which would allow use of reference management software. Proper citation of references lends credibility to risk assessments.

3. Essential elements of risk assessments

3.1 Themes

The top priority issue for the workshop as voted by participants was essential elements of risk assessments. Appendix 4 (Section A4.1) contains all the individual notes that were written on this issue. Themes that emerged within the issue of essential elements included: the use of science-based models, dealing with lack of data, the need for expert and independent assessors, improving consultation processes and developing nationally agreed policies and protocols. Break-out groups drew up recommendations for each of the themes using the format described in the methodology. These recommendations are outlined below.

3.2 Recommendations for essential elements

3.2.1 Science-based RA models

Situation: There is a need to have a scientifically based, validated, robust, repeatable risk assessment/scoring system for all vertebrates proposed for import in to Australia (and perhaps the states too). Where it includes qualitative components, experts should be consulted (eg for information on a species' overseas range).

Consequences if ignored: Inconsistent judgements about species between jurisdictions due to different processes, subjectivity and potential for bias. However, one advantage of people using different approaches could be the emergence of innovation when new people start afresh with an old problem — this has happened with weeds where there was divergence, but convergence is now occurring in RA processes.

Mission: Decisions on the importation of vertebrates are underpinned by an objective, evidence-based, defensible RA system, including qualitative expert assessment/review.

Execution: We have an existing RA model system (ie Bomford et al's models) that is based on extensive literature review and data sets, producing an evidence-based selection of criteria. We also have a new Excel spreadsheet tool (RAmodels) that should allow wider use of Bomford models.

A validation exercise is suggested, whereby a group of assessors from different jurisdictions compare their results for a given set of species, to test the consistencies, independence and uncertainties of the models as they stand. If uncertainty exists, determine whether this is due to access to data, or differences in approach or understanding. If a lot of inconsistency is found with this approach, it is recommended that the models be examined for redevelopment/refinement. This could be done through a consultancy (approx $50,000) through VPC, or in-kind staff contributions from different jurisdictions. There is also potential overlap here with the community-of-expertise mission in 3.2.4.

The models could be internationally peer reviewed by scientific experts to ensure they are robust. This could be done through a targeted invitation to examine the system (as per the usual process of scientific literature review), with an accompanying fee.

[*Editor's note*: the original Bomford (2003) models were reviewed by Keith Hayes and it was recommended that they be used only for birds and mammals. Since this time, Mary Bomford has developed further models for use with reptiles and amphibians, and freshwater finfish. The models for birds and mammals have also been updated and refined. See *Risk Assessment Models for Establishment of Exotic Vertebrates in Australia and New Zealand* at http://www.invasiveanimals.com/publications/downloads/Risk-Assessment-Models-report-FINAL.pdf (accessed April 2009)]

Administration: The VPC would initiate the process, recommending the system to the National Biosecurity Committee as part of the overall package for achieving national consistency, who could pass it up through the chain to the relevant standing committee and ministerial council.

3.2.2 Enhancing RAs with new tools

Situation: The current Bomford system of RA models is good, but needs improvement. It is limited by not fully considering propagule pressure, suitable habitat and illegal pathways. 'Better' tools (enhancing the system) could be incorporated as they are developed.

Consequences if ignored: If the RA system fails, confidence in the system declines and there is the potential for harmful impacts to result.

Mission: Continual improvement of the RA system, addressing knowledge gaps.

Execution: We need to better train RA model users, and develop new tools beyond the proof-of-concept stage (so they are validated and ready to use). To do this we need to look for knowledge gaps in current models, look for tools that can be developed and conduct sensitivity analyses (with different scenarios for criteria to be assessed).

Administration: The Australian Centre of Excellence for Risk Analysis (ACERA), IA CRC and other research agencies could develop new tools and better ways of handling current knowledge gaps. State and federal government agencies could be responsible for training and making new tools accessible. An estimated $30,000 would be needed for immediate training, but ongoing training would also be necessary. Research agencies would report to the VPC, upwards to the National Biosecurity Committee and so on to provide national direction.

3.2.3 Coping with lack of data and uncertainty

Situation: There is a lack of data available for conducting robust risk assessments.

Consequences if ignored: Lack of data could lead to a misleading conclusion or a wrong decision. It could lead to a legal challenge on a RA or decision to import.

Mission: To develop a clear process for managing uncertainty and missing data.

Execution: Feasible options include government commissioning research to fill current knowledge gaps, being transparent about lack of knowledge and where uncertainty exists, supporting global initiatives (such as the Commonwealth and Agricultural Bureau, International CABI, or Global Invasive Species Program — GISP) and establishing a clear process to manage uncertainty. This would include a clear framework to guide the import application process, with well-defined requirements for applicants, including response deadlines.

If lack of data results in a 'still don't know' situation, then a precautionary approach (say 'no' or restrict import) should apply.

Administration: not completed; needs further input.

3.2.4 Community of expertise

Situation: People currently undertaking RAs have varying levels of expertise, and there is a minimal sharing of skills (both nationally and internationally).

Consequences if ignored: Inconsistent decisions between jurisdictions and the possibility that animals with a potentially extreme risk of pest potential may be permitted entry into Australia without appropriate mitigation plans. On the other hand, trade opportunities may be affected if minimal-risk species are unnecessarily refused import. The public and/or environment will pay the price of any harmful impacts.

Mission: Build and maintain an appropriate level of expertise (in a community of practice) across jurisdictions to undertake pest animal risk assessments.

> **Execution:** It should be agreed to use the Bomford models and their successors as the national standard. Assessors should have, as a minimum standard of expertise, a degree or equivalent in biological sciences, and should be trained in the use of the RA models. A national list of accredited assessors should be established and maintained to avoid duplication of assessments, and increase trust between different agencies. Assessments should be shared and possibly moderated on a secure portal such as DEWHA's GovDex site. A feedback system should also be established as part of the RA process to strengthen communication among the community of practice.

DEWHA noted it is currently establishing a list of professionals to help them with various aspects of the EPBC Act, including risk assessments — any interested professionals may apply to be included. The existing list of consulting experts is being replaced. DEWHA representatives also said we should be ideally aiming to have one forum for discussion so that assessment discussions are nationalised, and the Department would be happy to expand and develop their current GovDex website as appropriate. They were concerned that if there is more than one site that issues may be missed.

Administration: A VPC working group could identify priorities and coordinate projects as necessary. Tasks include establishing a GovDex site (which could have synergies with the current Weeds Risk Management Forum* web portal), appointing a coordinator of the Pest Animal Community of Practice group (possibly the chair of the VPC working group). Terms of reference should be drawn up, with regular teleconference communication and face-to-face workshops. The IA CRC could also have a role in coordinating appropriate fora.

*The Weed Risk Management Forum was initiated by the CRC for Australian Weeds Management and is an informal network of state/territory and national risk assessors (border and post-border) who meet once or twice a year to exchange information, share tools, brainstorm technical issues, conduct training and develop collaborative projects. It is recognised by the Australian Weeds committee. Parent organisations cover travel costs of their respective staff. Biosecurity Australia has recently become a member. It has recently attracted grants from ACERA and Caring for our Country to address uncertainty in risk assessment and to develop a website to house weed risk assessments.

3.2.5 Independence of risk assessments

Situation: Currently, import applicants, or consultants employed by them, complete an environmental assessment as part of the import application. As such, there is a possibility these assessments may be biased in favour of the applicants, affecting subsequent decisions on allowing import.

Consequences if ignored: There was consensus, with the exception of DEWHA, that using information from an applicant's assessment may compromise final RA decisions, leading to the import of harmful species, and loss of credibility of the RA process.

DEWHA stressed that it undertakes further research and analysis of the applicant's information when conducting a full RA, and also seeks comments from appropriate state/territory ministers, the public and other stakeholders to counter any potential biases that may appear in the applicant's report (the full import application process is outlined in Appendix 5, part 9). Assessments submitted by the applicant form only one component of the department's RA. DEWHA representatives felt the current process is not likely to result in compromised RA outcomes.

The other workshop participants felt that if any information supplied by the applicant was used by DEWHA in the RA process, then the RA process would be flawed. Some said it is essential for the integrity of the process, for DEWHA (or a DEWHA-employed consultant) to start from scratch and re/collect an unbiased set of all the information required for the RA. DEWHA responded that information is requested partly to make the applicant propose mitigation plans where potential environmental threats are identified. This is a widely accepted approach under other provisions of the EPBC Act (eg environmental assessments on development proposals). The applicant is responsible for describing the activity, the nature of the organism and its likely pest potential and how any risks will be managed. DEWHA considered it important that the applicant has ownership of the action and its potential risks.

DEWHA said that under international agreements (eg the World Trade Organization's *Agreement on the Application of Sanitary and Phytosanitary Measures* — SPS Agreement), Australia is obliged to consider the risks of import, and whether or how these risks could effectively be managed. While the Bomford RA models give a rating or threat category, they do not include an assessment of possible mitigation measures that could be applied to reduce this threat.

Mission: All risk assessors to be free of pressures or motives that might influence RA outcomes.

Execution: Options include that expert RA operators are employed by regulatory agencies and do not use information supplied by the applicants or other stakeholders. Regulatory agencies should ensure there is a clear distinction between the scientific RA and any proceeding consultation with stakeholders that is used to inform the final decision; both processes are important but should be separate.

Administration: Regulatory agencies should administer these actions as soon as possible. No extra expenditure by government should be required: there was strong support in the group for the import application fee to include a fee for an independent assessor. DEWHA noted that the option of applicants paying for an independent RA consultant could be examined in the EPBC Act review, as the Act does not currently allow for this. [*Editor's note*: Public submissions for the review closed in December 2008. However, the secretariat has accepted comments and recommendations from this workshop as a late submission. An interim report is scheduled for release and further public comment in June 2009].

DEWHA noted that such an 'independent' RA could still be released with the applicant's draft assessment report as part of the public consultation process.

Some participants proposed that there must be a way that an independent set of data, upon which everyone agrees, could be collected and be subject to the risk assessment process, to produce something all jurisdictions felt confident in. Ideally this would mean different jurisdictions would not need to duplicate RAs to provide comment on the DEWHA draft.

It was acknowledged that there may be an increased likelihood of smuggling if applicant's fees became too high. Post-border legislation and enforcement for new introductions should be appropriately increased to mitigate this.

3.2.6 National policies for importation

Situation: There is no nationally agreed process for the determination of policy on the importation of animals with the potential to adversely impact the environment or social well being.*

Consequences if ignored: Ineffective use of resources (eg duplicity in BA, DEWHA and state agencies doing risk assessments) and an unclear national policy position on an appropriate level of protection.

Mission: Develop a nationally agreed policy determination process and an agreed implementation process to inform decision making.

Execution: VPC could convene a working group including DEWHA to recommend national policy options with a view to having regulations incorporated under the EPBC Act. The *VPC Guidelines for Importing and Keeping Exotics* (VPC guidelines, May 2004) could be updated to form or be included in such regulations. This would need to be done with regard to the timeframe of the current EPBC Act review (expected to be completed by October 2009).

Administration: Use of existing resources and agencies.

*There was some discussion about the perceived current lack of awareness of, or weight carried by, the VPC guidelines in Australian Government policy, despite being a national-level instrument. Some thought that Australian Government policy should be consistent with VPC policy, since the VPC represents all states and these long-standing issues have been discussed at length by relevant experts within the VPC already. It was noted however, that these guidelines are not a legislative instrument as they have not been signed off at ministerial level. It was thought that the VPC should be encouraged to bring the import and keeping issue back on the agenda.

3.2.7 National processes for animal ownership and acquisition

Situation: There are variations in Australian, state and territory government approaches to dealing with exotic animal ownership and acquisition. We need agreement on a uniform approach and consistency of base methods.

Consequences if ignored: Contradictory legislative/policy outcomes from the same RAs (since state/territory foci differ from each other and from Australian Government focus) and no consistent agreement on how to manage the potential threat of risky species.

The example was raised of the recent restricted import of venomous snakes into South Australia despite other jurisdictions expressing disapproval at RA stage. South Australia supported the decision to issue a permit for keeping in accordance with VPC guidelines; the final decision rested with the Australian government.

Mission: To achieve a nationally agreed government process (including VPC agreement) that is rigorous, transparent, science based, clearly defined, implementable, practical and flexible (case by case). The process would need to be endorsed by Primary Industries Ministerial Council (PIMC), Natural Resources Management Ministerial Council (NRMMC) and Biosecurity Australia (BA) — taking a cross-jurisdictional approach.

Execution: Standardise RAs using an agreed RA model and also manage a standard response to dealing with the RA outcome. Set boundaries and criteria about approaching applications — include this in a review of the VPC guidelines, removing any ambiguities.

DEWHA commented that there would need to be a review of the pros and cons of incorporating set boundaries and criteria. As the Minister for Environment is the decision maker, it may not be possible to have set boundaries or criteria.

Administration: Could be done with existing resources to share processes and communication. It was agreed that the workshop itself was laying foundations for a nationally agreed process.

The question was subsequently raised of whether we need to return to a 'one out, all out' decision-making process as previously adopted by VPC, if jurisdictions returned differing RA results. DEWHA representatives said DEWHA would have great concerns relating to 'one out, all out'. While acknowledging that once a species has been imported into Australia movement between states/territories is difficult to monitor/control, DEWHA said they would not recommend this proposal.

It was also noted that while states' input and VPC guidelines do form part of the Australian Government's risk analysis, these are only some of the elements considered. DEWHA considered that if risk mitigations are sufficient, they do not want to limit trade or break obligations under international agreements (eg Convention on Biological Diversity).

DEWHA also added that it is currently considering a streamlined process for a quick yes/no to applicants; for example if a species is already on the VPC list. The *List of Specimens Taken to be Suitable for Live Import* (live import list) is also currently under review. There was group discussion about how species could be added to or removed from this list. While there is currently no specific process in place to delete an item, requests are considered on a case-by-case basis in a similar fashion to applications to add a species (although this issue is being examined in the EPBC Act review).

The example of the VPC (and thereby all jurisdictions) requesting removal of sika deer from the permitted list in 2005 was raised: it was unclear whether DEWHA's assessment/decision had been made and if so, whether it was communicated to the VPC. DEWHA representatives said they would look into the details of this case. It was possible that there was considered no point in removing sika because they have been subsequently found established in the environment and/or that sika deer semen and embryos have been imported into Victoria so hybrids are likely to exist anyway. There was one reply that regardless of this, future imports should be banned, as should the future use of any imported sika semen. Another comment was made that while South Australia has been criticised for allowing the keeping of extreme threat exotic snakes in a high security, AQIS-approved facility, in contrast, the importation of reproductive material from an extreme threat species was allowed to be used for breeding in an unrestricted commercial agricultural enterprise. This seems a serious anomaly that should be investigated to determine the current level of risk and whether the situation can be recovered.

[*Editor's note*: DEWHA later reported a decision has not yet been reached on sika deer].

3.2.8 Consultation protocols in the import decision-making process

One recommendation was made to apply the Australian New Zealand Risk Management Standard (4360:2004), which deals with consultation required throughout risk assessments. It was recommended that pest regulatory authorities adopt this process for consultation. However, DEWHA participants said they were unaware of this standard, and would need to review it before making a decision on whether or not they agreed with this recommendation. It was suggested this could be readdressed at a future meeting.

Group discussion on this issue centred on the definition of consultation (emails, phone calls, web sites or more formal dialogue/documentation?) and how much state input is valued/used in the import decision process. The group as a whole strongly endorsed both acknowledgement and feedback from DEWHA on RAs submitted by jurisdictions. Some felt that with the current system their recommendations are not duly recognised and that their RA is therefore a waste of time. DEWHA needed to be clear on how/whether state input is included in recommendations (eg to restrict import to male specimens only) presented to the minister.

It was agreed that DEWHA's proposed use of the new GovDex site should help address the current lack of feedback and generally improve communication between jurisdictions at different stages of the import process. It was agreed that if we can get consistency and trust established before import, there will be fewer problems post-border. Once a species is allowed in, it becomes a risk mitigation issue for state governments rather than a risk assessment issue, so it is important to be clear on state input into the conditions of its import.

4. High-risk species already in Australia

4.1 Themes

The second top priority for the workshop to address was considered to be managing high-risk exotic vertebrates already in Australia. Appendix 4 (Section A4.2) contains all the individual notes that were written on this issue. Themes that emerged included the need for: a national approach to manage high-risk species (a decision tree), surveillance of species presently kept, agreed levels of containment, auditing of secure facilities, and options for reducing the number of high-risk animals in Australia. Break-out groups drew up recommendations for dealing with each of the themes, as outlined below.

4.2 Recommendations for high-risk species

4.2.1 Decision tree for preventing establishment of new pests

Situation: A large number of high-risk species already exist in Australia (excluding those that have already established), resulting in a significant risk of new pests establishing.

Consequences if ignored: More significant pests will establish in the environment with harmful impacts.

Mission: Reduce the number of high-risk species kept and stop those that are kept from becoming established in the environment.

Execution: Options include an audit of the numerous species being kept (estimated to cost $100,000), including current VPC lists, the live import list, and the Ornamental Fish Management Implementation Group's Grey List or Blue Book of fish. Rapid RAs of these species could be done using an agreed risk matrix and allowing a quick decision on the appropriate strategy to contain, control or eradicate. More comprehensive RAs could be done where deemed necessary (this would be expensive). Generic incursion response plans should be developed and coordinated through an identified mechanism.

Administration: Could be actioned through the VPC and upwards to Ministerial Councils as per 2.1.3 in the Australian Pest Animal Strategy. This should be proactively done within 2009.

4.2.2 Post-border surveillance for high-risk animals

Situation: Post-border surveillance is informal, inconsistent and unreliable for the early detection of exotic (national priority exotics) pests. It is largely passive rather than proactive. This includes surveillance of new introductions, pest species currently kept and illegal activities. It is very difficult to detect animals entering the states inadvertently, through escaping containment or illegal movement. There is a concern that state jurisdictions are not informed of species intercepted at port and their pathway of entry — such information could be used to target monitoring of high-risk areas. There is also concern that if AQIS is under-resourced, the risk-based assessments used at ports could allow some exotic species to enter Australia, and the subsequent level of surveillance may be too limited to be effective. If this is the case, the states will likely have to pick up the consequences of incursions. We need coordinated surveillance as recommended in the Beale review.

Consequences if ignored: Establishment of new pests, inefficient use of resources and possible loss of markets, biodiversity and lifestyle values.

Mission: An agreed national post-border monitoring and surveillance program for national priority exotic pests (eg with additional surveillance at ports, as per Beale review recommendations).

Execution: Options include a formal cost-shared national surveillance program based on identified risk pathways such as accidental release, smuggling, or movement from a contained facility. A national database (or other tools) for surveillance and audit data could be established — risk pathways could be developed if we knew locations and numbers of species. Incentives could be provided to encourage reporting, while disincentives could be removed. Informal community-based surveillance activities could be promoted (eg with hotlines operating 24 hours, 7 days a week). Self pest animal monitoring (eg zoos reporting on numbers of high-risk species kept, their movements, etc) could also be encouraged. Secure containment facilities could have both internal and external audit processes. Jurisdictions could also have some form of active monitoring program (details on such a program were not specified).

The group strongly endorsed the recommendation that feedback from government agencies on surveillance and detection reports be included in the proposed National Biosecurity Agreement, and should be based on threat categorisation, involve an alert list, a 'WEEDeck'* equivalent to identify pest animals and so on. It is important that all jurisdictions are able to access information from a central source, to enable consistent policy responses and on-ground action.

Administration: VPC and state/federal governments could coordinate surveillance. The mission would need to be comprehensively scoped for a cost estimate.

*WEEDeck is a national pocket field guide on weed identification, produced by the Australian Weeds Committee. For further information, see http://www.weeds.org.au/weedeck.htm (accessed April 2009).

4.2.3 Nationally agreed categorisation and containment levels

Situation: There is a need for a national agreement and commitment to align risk categories for exotic animals with risk management (an agreed minimum security level).

Consequences if ignored: Could lead to inconsistent decision making, use of different security levels, proliferation of high-risk species in lower security situations, and increased risk of escape/establishment due to propagule pressure.

Mission: National agreement of revised security levels endorsed by the NRMMC, possibly linked to a cost-sharing arrangement.

Execution: Review existing security levels and the VPC guidelines for managing animals in each threat category. The review should include an auditing component of facilities and security levels. A review of New Zealand's containment levels would also be useful. The fate of animals seized at the border should be clarified; especially species that need to be 'rehoused'. ARAZPA added that it would like a Memorandum of Understanding with border and post-border agencies on a consistent approach to the fate of seized animals.

Recommend the nationwide uptake of the VPC guidelines, revised if necessary. It would be useful to maintain the current approach of the VPC's matrix of threat categories and recommended management responses regarding security options, breeding plans, numbers permitted and so on (eg species rated as Extreme threats should either not be imported or be approved only for particular high-security facilities*, Serious threats could be permitted in only as single sex in limited numbers, etc).

*DEWHA participants said DEWHA would not accept the automatic exclusion of all animals assigned a VPC Extreme threat category, but would still allow import with mitigation measures into zoos, labs or similar facilities.

Administration: Could be done with existing resources, in-kind through a VPC working group (such as the current Exotic Species Working Group). Technical advice from ARAZPA, AQIS and ERMANZ could also be involved. Action should be taken as soon as possible.

4.2.4 Control options for reducing numbers of high-risk animals

Situation: There is no set process for removing or reducing high-risk species from trade and captivity in Australia.

Consequences if ignored: An increased risk of pests establishing and subsequent costs.

Mission: To reduce the risk of new pest species establishing by implementing control methods that are feasible.

Execution: Audit species to be dealt with; where they are and how many there are. For phase outs, the message needs to be put out that certain species will be prohibited for trade, to enable attrition of numbers and species. Hand backs could be an option at certain points, but it should be noted that amnesties have not worked well in the past. Education would be needed, working with traders to make it effective. No further permits or licences to trade or breed should be issued. High-risk species should be limited to high security facilities such as zoos. A nationally consistent approach should be taken.

Administration: These actions would need to be highly resourced with many staff, requiring considerable funding and consultation. All relevant state and Australian government departments should be involved.

4.2.5 Education about high-risk animals

Situation: Existing education packages are underutilised and need to be revamped to alert the general public on the role they can play to minimise the risk of high-impacting pest species.

Consequences if ignored: The general community lacks awareness and does not support policy and programs mitigating against high-risk animals.

Mission: Encourage behavioural change through education (eg eliminate the 'cute can't kill' mentality).

Execution: Identify pathways and stakeholders (audience) for education. Conduct an audit of current education tools and identify the gaps. Develop incentives to report (financial or other incentives that make people 'feel good' for reporting), and develop a public face/owner for each campaign that people can relate to and remember.

Administration: The IA CRC would be a good candidate for funding and coordinating this mission*, with support from industry, state and federal government funding. Existing staff and/or a consultant could be involved.

*It was noted that the VPC is considering a broad communication strategy for high-risk species under a National Awareness Action Plan and has recently engaged with the IA CRC. The Ornamental Fish Management Implementation Group is also currently looking at education packages, specifically targeting the fish trade: they have developed a postcard, pamphlet, website and strategic approach booklet.

4.2.6 Auditing containment facilities

Situation: Current auditing of permit controls for species allowed conditional entry into Australia is inconsistent. Levels of containment where animals are to be kept particularly need to be audited.

Consequences if ignored: A higher risk of escape and/or proliferation of pest species. A publicised issue could also bring the entire permit system into disrepute.

Mission: Effective implementation of controls for keeping high-risk species and robust auditing.

Execution: Standards for high-security containment facilities are needed, and these could feed into standards for animal welfare in zoos. A collation of relevant information currently listed under different legislation could be useful in this process. There could be accreditation for facilities, and the Australian Government could stipulate that high-risk species can only be kept by specific (accredited and complying) institutions. A standard template for compliance auditing (ensuring secure containment) is needed, although auditing should be tailored based on resources and situation. This auditing should allow states/territories to keep better track of where animals are being kept, and inform them of escapes/releases. Relevant legislation should also be standardised, with enforceable consequences for failing audits. An escalating scale of response to non-compliance could be introduced so that repeatedly failing to comply is costly. Conversely, complying with standards would increase trust in handlers/zoos/laboratories.

The audit system should allow for random auditing, regular and consistent auditing, and auditing of the auditors. There should be cost recovery for audits (ie keepers pay for audits) to allow for the use of independent commercial auditors. Cost recovery could also cover the event of an escape due to non-compliance.

The group agreed New Zealand's auditing system was impressive, and thought a similar system could work in Australia.

Administration: The Australian Government and states/territories would all have a role. DEWHA and AQIS would be responsible for import permit conditions and states/territories could input via VPC guidelines. There was comment that funding from containment facilities would be essential as auditing is a costly process and often the first to fall off state government's 'list to do' due to lack of resources.

4.2.7 Cost-sharing agreement

Situation: There is currently no intergovernmental agreement (IGA) to cover escapes of high-risk species.

Consequences if ignored: Could be an inability to respond to escaped animals, with the possibility of new pest species establishing.

Mission: To achieve an AusBIOSEC-style IGA or suitable alternative.

Execution: An insurance-style system with cost recovery for industry plus an IGA top-up could be established. The cost of detection and destruction could be paid for by industry (through an insurance claim), with actions undertaken and costs initially borne by government (although the group acknowledged that issues could arise from proof of origin of escape and the time lag between escape and intervention). Insurance could be linked to the issue of permits and an annual audit. The accord option could include surveillance and audit cost sharing as part of the IGA. If a state does not comply with standard monitoring and surveillance then they would not qualify for the cost-sharing arrangement.

This was considered an optimistic approach, which would only be relevant for situations where the industry/individual/agency in charge of a contained or controlled species was found to be in breach of their responsibilities. It does not address the situation of illegal or uncontrolled species that escape and subsequently cause problems.

Administration: State and territory representatives through current AusBIOSEC process and VPC could be responsible for this mission. It could be potentially very expensive to achieve. Triggers for a cost share could include if species are declared under 'official control' (ie as per the World Trade Organization definition) in relevant state/territory acts, in terms of legal requirements for control, captivity conditions, permits, prohibition on trade and movement and so on. Clear criteria for defining an outbreak would be needed to determine whether an escape would qualify as an incursion if the species is already known to be held in Australia.

5. Other priority issues

5.1 Question: 'What remains to be dealt with at this forum?'

Appendix 4 (Section A4.3) contains all the individual notes that were written in answer to this question.

Themes that arose were:

- the management of hybrid species
- an agreed national appropriate level of protection
- a national information system for exotic vertebrates.

Recommendations for dealing with these three themes are outlined below. Several ungrouped issues were also raised but not dealt with in detail and these are included in the final list below.

5.2 Recommendations

5.2.1 Hybrids

Situation: There is a lack of clarity on what defines a hybrid. Problems arise over what is classified as domestic versus wild morphs, such as ferrets and polecats. Taxonomic issues could arise with subspecies when one subspecies is present in Australia already and another subspecies is then imported, resulting in the potential for cross breeding. Similarly, indigenous subspecies could cross with imported subspecies and change the characteristics of the native (eg Eclectus parrot). The definition of hybrids is also currently unclear with respect to importing crossbreeds (eg with the savannah cat: at what point is a hybrid considered 'domestic' and safe to import?). Confusion has also arisen from the original intents of putting animals on the live import list, and the subsequent import of hybrids derived from these animals.

Mission: To define the scope of what a hybrid represents and make appropriate policy decisions on importing and keeping them in Australia.

> **Execution:** Produce a scoping document for definition of hybrids/crosses. [Mark Williams (SA DLWBC), Geoff Ridley (ERMANZ) and Paul Andrew (ARAZPA) volunteered to do this as soon as possible.] Engage a consultant/s, review legislation in other countries regarding hybrids and review the live import list.

Administration: DEWHA could coordinate this mission, with input from state and territories. Estimate cost of $62,000 or more.

[*Editor's note*: at the time of printing, DEWHA is in the process of engaging a consultant to address these hybrid issues.]

5.2.2 National ALOP

Situation: There is no consistent agreed appropriate level of protection (ALOP) or risk between the Australian Government and other jurisdictions. The risk matrix in the current VPC *Guidelines for Import, Movement and Keeping of Exotic Vertebrates in Australia* has not been formally reviewed or agreed to. Benefits of exotic species are not included in the matrix, and public versus private use of exotics is not recognised. In addition, there is currently conflict in the way risk is treated in the Convention on International Trade in Endangered Species of Fauna and Flora (CITES), Convention on Biological Diversity, and the World Trade Organization's Agreement on the Application of Sanitary and Phytosanitary Measures (SPS agreement). The issue of propagule pressure (number of release events) was raised: some thought it may not

be fully covered by the VPC guidelines' matrix, although there was comment made by the group as a whole that the matrix's security levels do provide for management conditions to be applied, including breeding plans, single sex animals, etc and so in effect cover the number of animals kept (but once again, these recommendations need to be nationally agreed to).

Mission: To develop an agreed risk matrix that involves a dissection of costs, benefits and public versus private use. There needs to be an agreement on the calculus of risk — how things are weighed up to give the final threat category.

Execution: Review the VPC guideline's matrix and develop agreed parameters for assigning risk and levels of protection.

Administration: not completed.

5.2.3 National information system

Situation: Many relevant databases on pest animals exist. How can they be linked and information made more accessible?

Mission: Validate existing data, make it consistent for its purpose (eg rationalise spatial data, make information consistent for auditing etc) and make it accessible.

Execution: Options include an audit of existing information (as described in surveillance/audit sections above), and a gap analysis considering what people's obligations are to report new incursions. The need for consistent protocols regarding notification of all new incursions should be considered, with AusBIOSEC as a possible mechanism (since AusBIOSEC does cover escapes as well as quarantine issues). The role and applicability of the BIOSIRT national database tool, currently proposed for emergency disease outbreaks, should also be considered (ie its usefulness for routine surveillance and reporting on a day-to-day basis). States could retain individual's details, but the general information could be put in a common repository. A national audit system for established pest plants has been developed (by DAFF); we need a similar process for exotic animals.

Administration: VPC could act as national coordinator or secretariat for determining what pest animals are in the country, as they are already coordinating the update/formation of such lists. Funding would be needed (specific sources were not suggested).

[*Editor's note*: The IA CRC has recently published national maps of key pest animal distribution and abundance, based on nationally agreed monitoring and reporting standards. These are available online at http://www.invasiveanimals.com/regions/national-invasive-animaldistribution-and-abundance-maps/index.html]

5.2.4 Other issues

The following issues were also acknowledged as important, but were not further dealt with at the workshop:

- harmonising legislation across jurisdictions
- considering the feasibility of eradication
- difficulties with identifying species
- the possibility of using native species as alternatives to exotics, for example as pets (but this could lead to concerns of non-endemic natives entering states)
- the overarching issue of funding for all issues raised.

6. Final conclusions

6.1 Question: 'From the workshop's discussions, what are the key recommendations?'

The single RA system could contain similar elements as the *HB* 294-2006 *National Post-Border Weed Risk Management Protocol*[3], which aligns with the Australia/New Zealand standard for risk management and includes weed risk identification and prioritisation, and feasibility of control/eradication options. It was suggested that a handbook for pest animals could be developed in which everyone agrees on the fundamentals of what should be included in the risk assessment system.

This forum recommends a:

- nationally agreed approach for
  - a single risk assessment system, each species assessed once, by accredited, independent assessors paid for by the applicant
  - the level of security needed for assigned threat categories
  - standards for secure facilities and auditing of these facilities
- review and consolidation of information on exotic vertebrates within Australia
- review of existing education packages and a rollout of revised packages in a communication campaign as a component of the Australian Pest Animal Strategy.

The forum acknowledges DEWHA's recent improvements in consultation processes for importing exotic species and recommends further refinements to aid in communication between all stakeholders.

The forum recommends moving towards harmonising exotic species policies and (eventually) supporting legislation.

There was a clear consensus for a nationally coordinated approach to a single RA system, with involvement of federal and state governments and other stakeholders. Consensus was reached on using the Bomford models for independent, science-based risk assessments, with a clear distinction between the scientific RA and the subsequent consultation/decision process. Other general conclusions included the need for an agreed approach to communication plans, security levels and containment auditing. The need to avoid duplication and to increase trust between jurisdictions was also emphasised. There was general appreciation of DEWHA's efforts in improving consultation with the states since the August 2008 meeting. It was agreed that progress on this issue is being made and should continue with state government and stakeholder input where appropriate.

Many participants expressed satisfaction with the IA CRC workshop's organisation, process and outcomes. Participants said the workshop proceedings should be circulated to DEWHA, DAFF, ARAZPA and relevant state agencies through VPC. A follow-up meeting with VPC, IA CRC and DAFF representatives was planned to get key tasks identified in this workshop onto the VPC agenda. The participants were thanked for their efforts in attending the workshop, and the workshop was officially closed.

3: *Anon. (2006). HB 294-2006 National Post-Border Weed Risk Management Protocol. Standards Australia, Standards New Zealand and CRC for Australian Weed Management. See http://infostore.saiglobal.com/store/Details.aspx?DocN=AS0733774903AT (accessed April 2009)*

7. Acknowledgements

I would like to sincerely thank all the attendees for their time and participation in the workshop. The assistance of Dr Mary Bomford and Lloyd Kingham with organising and running the agenda is greatly appreciated. The input from individual state/territory agencies for participants' time, transport and accommodation is also acknowledged. Thanks also to those workshop participants who provided constructive comments on the draft workshop proceedings.

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Appendix 2: Workshop agenda

Day 1

9:30 am	Morning tea
10:00 am	Introduction — Dr Wendy Henderson, IA CRC
10:05 am	House rules — Lloyd Kingham, Facilitator
10:10 am	Summary of outcomes from Commonwealth/states meeting August 2008 on Live Animal Import Controls — Bernadette Oakes, DEWHA
10:30 am	Scientific models for risk assessment — Dr Mary Bomford, IA CRC
10:50 am	Prioritising issues for workshop
12:30 pm	Lunch
1:30 pm	Whole group: Establishing general principles for RA essential elements
2:30 pm	Break-out groups: Specific actions for RA essential elements
3:00 pm	Afternoon tea
3:20 pm	Whole group: Establishing general principles for high-risk species
4:30 pm	Break-out groups: Specific actions for high-risk species
5:30 pm	Finish Day 1

Day 2

8:30 am	Live import process in New Zealand — Dr Geoff Ridley, ERMANZ
8:45 am	Review of Day 1 — dissent and comment
10:30 am	Morning tea
10:50 am	CLIMATCH demonstration — Joe Crombie, BRS
11:00 am	RAmodels Excel tool for risk assessments — Dr Greg Hood, BRS
11:10 am	Whole group: Other high-priority issues for the workshop
12:30 pm	Lunch
1:15 pm	Break-out groups: Specific actions for other high-priority issues
2:30 pm	Concluding recommendations
3:00 pm	Afternoon tea and workshop close

Appendix 3: Prioritisation of issues

Issue/ Problem (see details on following pages before completing)	**Decision criteria for workshop (WS)**						**Total score**	**Rank**
	Consequences of not addressing issue: **0 = trivial** **5 = dire**	**Complexity of problem (time at WS required to resolve):** **0 = v. complex** **5 = v. simple**	**Likelihood of WS identifying a workable, affordable & practical solution:** **0 = hopeless** **5 = almost certain**	**Likelihood a clear majority of WS participants will agree on best solution:** **0 = hopeless** **5 = almost certain**	**Impediments to implementing solution:** **0 = extreme** **5 = trivial**	**Is this issue/ problem already being addressed elsewhere?** **0 = Yes fully** **5 = Nothing being done anywhere**		
A. Essential elements								
B. Acceptable risk								
C. Risk/mitigation factors								
D. Inconsistencies/ inadequacies								
E. High-risk species								
F. Hybrids								

Appendix 4: Participants' notes

A4.1 Discussion session 1 — Essential elements of risk assessment

Individual points made during this discussion centred on the need for RAs to be done by independent experts using science-based models, tools needed to enhance these models, dealing with lack of data, improving consultation and national approaches to policy and legislation.

A4.1.1 Science-based models

- robust and repeatable results
- focus on evidence ('weight of evidence' or 'burden of proof')
- validated RA model that addresses both likelihood and consequences and can be applied at any geographic scale
- science-based and shared RAs, for all to comment on (help with understanding the process, minimising operator differences and uncertainties)
- use of science-based models plus qualitative assessments.

A4.1.2 Enhancing RAs with new tools

- suitable habitat versus climate match needed in science-based models
- search theory, trade routes, screening tools needed
- getting a handle on propagule pressure and pathways of entry
- RAs should consider risks associated with illegal pathways (eg smuggling if high-risk species is prohibited).

A4.1.3 Coping with uncertainty

- lack of data makes assessments difficult
- accessible, central and comprehensive information sources that we all share, which allow us to assess uncertainty in evidence
- avoiding 'operator bias' — comprehensive literature search that includes databases, journals, grey literature and expert knowledge
- coping with uncertainty and missing data — need for acceptable minimums
- need for precautionary principle.

A4.1.4 Level of expertise

- need high level of expertise of assessors
- risk assessments should be conducted by wildlife ecologists
- level of expertise required — need for use of independent experts
- collegiate approach: a community of practice is needed to share and build expertise.

A4.1.5 Independence of risk assessments

- assessors need to be independent, not employed by applicants
- RAs need to have immunity from political considerations/bias with respect to vested-interest groups
- operator bias needs to be considered and avoided
- import risk assessments need to be separate and independent from any subsequent consultation/decision process.

A4.1.6 National/international policies

- RA system should consider the national interest, not just parochial interests
- why are DEWHA, Biosecurity Australia and state jurisdictions each doing RAs? Need to be more efficient
- there should be regional (Australasian) interaction on reviewing science-based models
- need a shared assessment of review process on a nationally agreed basis — harmonise state and Commonwealth legislation.

A4.1.7 National processes

- RA process should be free of political interference, science based, nationally agreed, rigorous and transparent
- need national agreement on a uniform approach (endorsed by the VPC)
- we need templates to think of everything
- need to agree RA should be assessed case by case
- need ability to replicate RA and obtain same result
- good RA process must result in decisions that are acceptable and practical to implement, by all governments and stakeholders (ie national consensus for implementation)
- need agreed processes and review mechanisms to reach/make decisions — leading to practical enforceable solutions
- need nationally agreed definitions and they need to be clear (eg for 'low risk', 'high security' etc)
- need consistency of base methods, with flexibility to look at other options (we need to think of everything)
- need to know what is an acceptable level of risk that assessment defines, rather than just relying on the precautionary principle.

A4.1.8 Consultation protocols

- consultation and review process needs to be clarified and decision needs to be transparent
- beware expert bias and overconfidence — need to have good consultation mechanisms for RAs with other experts
- need to have wide consultation and review — public, non-government organisations, stakeholders, experts, government departments
- need to have agreement about limits and scope of comments and consultation (to restrict comments to what is relevant and achievable)
- consultation and review process needs to have plenty of information sharing
- need to consider how much weight is given to stakeholder input.
- power of veto for imports should be an option — 'one out, all out' policy, through coordination with the VPC.

A4.2 Discussion session 2 – Managing high-risk animals in Australia

Individual points made during this discussion included the need for a decision framework, an agreed approach to appropriate level of protection and auditing of contained facilities. The need for increased post-border surveillance for new incursions and agreed control options to phase out the number of high-risk animals was also raised. Educating people about threats posed by high-risk species (including illegal trading), and encouraging community members to report identified pests was also considered important.

A4.2.1 Decision tree for preventing establishment of new pests

- need to deal with species previously imported, not covered by EPBC Act
- undertake pathway analysis to help prioritise which species to deal with (how the animals got/will get into the environment, how they move around, who is involved etc)
- rate high-risk species to target 'most' risky
- need greater understanding of impacts of existing species, and use this knowledge to come up with ways to minimise impacts and prioritise resources
- need consistency between states and territories
- response strategy depends on numbers in captivity, existing regulation (prosecution options), resourcing (audit, reports), and whether animals are legally or illegally kept
- need for a national approach to managing high-risk species — a decision tree
- need funds for contingency plans to eradicate escaped/released animals
- need national control plans
- need a review of the live import list.

A4.2.2 Post-border surveillance

- need a national database available to states and territories of where and how many high-risk animals exist, and their reproductive status
- need enhanced surveillance on a cooperative state/federal government basis, as recommended in the Beale review
- need to develop cost-effective monitoring protocols for high-risk species
- need for a pest animal spotters network (similar to weed spotters).

A4.2.3 Nationally agreed categorisation and containment levels

- apply restrictions on import as per VPC guidelines
- need consistent legislation across states on high-risk species, guided by Alert List
- need agreed national minimum level of security (as per VPC guidelines), agreed to by NRMMC
- adhere to VPC's national categorisation of species (mammals, reptiles, birds) by doing inspections and control of high-risk species
- develop protocols/regulations for commercialisation of pest animal species
- need national containment facility standards for species approved for import.

A4.2.4 Control options

- licence and control high-risk species with conditions — forbid trade and breeding
- phase outs are needed from trade and breeding
- restrict breeding and trade of high-risk species
- desex pets (difficult with fish though)
- review list of species kept and eradicate species no longer required or that pose unacceptable risks
- euthanase or desex high-risk animals
- concentrate high-risk specimens in high-security facilities
- amnesty/sterilise/etc those in captivity
- existing permits should be phased out for private owners.

A4.2.5 Education about high-risk species

- community education to be elevated as a priority and be provided with adequate resources
- public awareness and incentives to report high-risk species
- community education about risks of exotic pest releases and escape
- public education on illegal trading of high-risk species
- awareness to be raised about high-risk species kept in low security or no containment
- media packages and compulsory signs at trade outlets (eg 'no more – it's the law')
- communication and education to be based on priority pathways (ie targeted)
- education about rare high-risk species to enable detection and control — gain public support, use amnesty and rewards.

A4.2.6 Auditing facilities

- quality assurance audits of facilities with a practical system to address non compliances
- fund production of standards of methodology for monitoring, evaluation and reporting
- agreements by traders to adhere to, as one type of compliance — pest animal accords (eg fish)
- cross-border security, interstate cooperation and training
- cost recovery compliance
- proactive implementation of compliance (we have laws — enforce them!)
- implement an auditing process, sharing information between states
- auditing, with ability to revoke permits
- adequate funding for auditing zoos and other facilities keeping high-risk species
- auditing of keeping permits
- permits assume monitoring and compliance will always happen, but this is not the case
- virtually no surveillance/compliance effort put into smuggled animals in some states
- improve compliance through intelligence, sharing resources
- better audit/monitoring of permit conditions, with the application of penalties when those conditions are breached
- auditing zoos to ensure there is compliance with regulations and no illegal movement of surplus stock (who pays?).

A4.2.7 Cost sharing IGA

- link risk management to AusBIOSEC cost share arrangements
- cost-sharing agreement for escapes of high-risk species from captivity (should it qualify as a national incursion?).

A4.2.8 National ALOP

- What is an appropriate level of protection? Do we oppose import or accept with mitigating factors? When do you let a species into high security? What is the process?
- Can an Australian standard mitigation plan be acceptable to all jurisdictions?
- consider movement between sectors, particularly where a species is categorised differently between jurisdictions
- How are benefits considered in decisions to import? (value-laden factors)
- risk mitigation factors need to be standardised
- beware the 'administrative creep', where a species is permitted in for one reason, then once in, people ask if they too can keep it for a different purpose
- acceptable level of protection needs thought
- how to balance private benefits against public/national risks in decisions about regulating exotics
- options to manage high-risk species will vary with circumstances of holding and the numbers of animals held.

A4.3 Discussion session 3 – Other high-ranking issues

Individual points centred on strategies for dealing with hybrid species, the need for a national information system and other miscellaneous issues.

A4.3.1 Hybrids

- How do we deal with hybrids?
- Following the Savannah cat decision, what AQIS protocols are in place to check cats coming into Australia? [DEWHA responded that there is a process in place: if cats look suspicious then experts are called in to identify them, determine whether desexed etc and DEWHA is notified.]
- How many states have banned savannah cats? Post-border restrictions are needed to reinforce quarantine
- southeast Asian subspecies need to be considered with regards to risk of interbreeding with native subspecies (eg Eclectus parrots)
- Should we allow hybrids in and what generation would they be acceptable? (eg currently 5th generation for cat hybrids to be considered domestic although this was disputed with the savannah cat decision).

A4.3.2 National information system

- Which high-risk species being held could be the next pest?
  (linked to concept of an alert list)
- Do we need a national database of high-risk species? If yes, who should collate information etc?

A4.3.3 Other points, not followed up with specific recommendations

- privacy/legal issues in backyard surveillance need to be considered (right of entry issues etc)
- need to figure out what we want in our legislation — sometimes doing the best for invasive animals clashes with implementing current legislation
- need to look at harmonising legislative frameworks
- difficulties with identification at import ad other levels of surveillance/auditing (eg ornamental fish)
- Should feasibility of eradication be taken into account in decisions about import and keeping?
- should consider whether there are suitable native alternatives for some purposes that exotics are currently brought in/kept — exotics may not always be best.

Appendix 5: Australian, state and territory risk assessment processes

Summary of risk assessment processes used by Australian and state/territory governments

1. New South Wales
2. Victoria
3. Queensland
4. South Australia
5. Western Australia
6. Tasmania
7. Australian Capital Territory
8. Northern Territory
9. Australian Government DEWHA
    - import process
    - terms of reference
    - guidelines for import applicants

1. New South Wales

NSW administers The *Non- Indigenous Animals Act 1987* and *Exhibited Animals Protection Act 1986*. These two Acts involve the importing, keeping, movement and licensing of exotic animals in both private and public collections.

The Department of Environment and Climate Change administers the *National Parks and Wildlife Act* and licences persons to keep protected fauna in NSW and import and export protected fauna interstate.

NSW Department of Primary Industries administers both the Non Indigenous and Exhibited Animal Acts.

The Non Indigenous Advisory Committee (NIACC) is a Ministerial-appointed committee that is responsible for the risk assessment of all exotic species prior to NSW licence approvals being issued. This 11-member strong committee relies on the knowledge, skills and expertise within the committee to assess the risk of each species. The Department of Environment and Climate Change and Taronga Conservation Society are both represented on NIAC.

Where appropriate this committee relies on additional information supplied by the Australian Vertebrate Pests Committee (VPC).

It is understood that both VPC and the NIACC have used early published reference material by Dr Mary Bomford, Bureau of Rural Sciences.

This methodology is now subject to review and will form a part of an overall review of both the Non Indigenous and Exhibited Animals Acts.

2. Victoria

In Victoria, the Department of Primary Industries (DPI) has overarching policy responsibility for invasive plants and animals. The Department of Sustainability and Environment (DSE) and Parks Victoria have the responsibility for the management of invasive plants and animals on their lands.

Under the *Catchment and Land Protection Act 1994*, animals can be declared as:

- Prohibited pest animals, if:
    - the Minister is satisfied it did not occur naturally in the wild in Australia before European settlement and either
        i. it is a serious threat to primary production, Crown land, the environment or community health in a place outside Victoria; or
        ii. its potential to threaten primary production, Crown land, the environment or community health in Victoria is unknown and
    - its importation, keeping and sale should be banned.
- Controlled pest animals, if:
    - the Minister is satisfied it did not occur naturally in the wild in Australia before European settlement and
    - it has a high potential to become a serious threat to primary production, Crown land, the environment or community health in Victoria; and
    - it should only be kept in high security collections approved by the Minister.
- Regulated pest animals, if:
    - the Minister is satisfied it did not occur naturally in the wild in Australia before European settlement and
    - it has a high potential to become a serious threat to primary production, Crown land, the environment or community health in Victoria; and
    - it should only be kept in collections or at premises approved by the Minister.
- Established pest animals:
    - the Minister is satisfied it is established in the wild in Victoria and
    - it is a serious threat to primary production, Crown land, the environment or community health in Victoria; and
    - it should be eradicated or controlled or its spread in the wild should be prevented.

Species were assigned to these categories and were proclaimed by Order in Council in 1997.

DPI currently utilises the Bomford Risk Assessment Model, the VPC 'List of Exotic Animals' and 'Guidelines for Import, Movement and Keeping of Exotic Vertebrates in Australia' and the DPI Information Notes 'A Guide for the Control Over the Possession, Trade and Movement of Declared Pest Animals' when making policy decisions about the import and keeping of invasive animal species. DSE is guided by DPI's assessments and advice, but also seeks the advice from relevant technical experts in relation to potential impacts on biodiversity assets.

DPI is currently reviewing legislation and the administration of the keeping of invasive animals. This project will involve the amendment of the list of declared species in Victoria and associated policies changes to bring keeping requirements in line with the current VPC threat categories.

In addition, through DPI Future Farming Strategy a new four-year project has recently commenced to 'extend Victoria's prevention and early response capability for new and emerging species'. The project aims to:

- use existing national models for exotic pest animal risk assessment to develop and implement a Victorian exotic pest animal assessment tool to identify high risk species
- use recent national strategies for exotic management to review current Victorian exotic pest animal programs
- conduct an analysis of current pest legislation to investigate potential improvements to prevent the introduction of priority pests into Victoria
- use national best practice to develop a detection and response program for exotic species.

3. Queensland

Risk assessment is used to:

- decide which species should be subject to restriction on introduction and keeping under the Queensland *Land Protection (Pest and Stock Route Management) Act* 2002
- decide what level of restriction should apply to each species (*viz*. total ban, kept under permit to certain zoos, or no restriction)
- decide which naturalised species should be declared as Class 2 pests and what the general policy position should be.

As specified in the Queensland *Land Protection (Pest and Stock Route Management) Act* 2002 and associated regulation, it is an offence to introduce or keep a 'declared' pest animal without a permit. Regulation lists species that can be introduced and kept and defines the *purposes* for which they can be kept/introduced (eg there is a specific schedule that lists which species can be held by zoos, and other schedules that list which species can be held for other purposes). The regulation defines the various purposes of keeping, including what is meant by terms such as "zoo" and "public education" etc.

Risk assessment is used as a "tool" to guide decisions on which exotic vertebrate species (mammals, reptiles and amphibians only) should be listed as 'declared pest animals' and therefore subject to restrictions on introduction, possession and sale.

Hence, risk assessment is used primarily to develop and amend legislation that restricts the introduction and keeping of certain exotic animals.

4. South Australia

All applications to import exotic vertebrate animal species into Australia are referred by the Department of Water, Environment Heritage and Arts (DEWHA) to the Minister for Environment and Conservation in South Australia for comment in accordance with the Australian government's Live Import Listing Process.

South Australia makes a decision to support or reject an application based on the risk assessment and supporting information provided by the applicant and DEWHA. South Australia does not conduct a separate risk assessment prior to making comment on the application.

If an application to import an exotic vertebrate animal is approved by the Australian government, the SA Department of Water, Land and Biodiversity Conservation (DWLBC) will make a decision whether to issue a permit to allow the species to enter the state. This decision is made in accordance with the national Guidelines for the Import, Movement and Keeping of Exotic Vertebrates in Australia (NRMSC May 2004) and state government policy. These guidelines provide a process where all exotic animal species in Australia have had their level of threat assessed using the risk assessment models developed by Dr Mary Bomford and have been

placed in a threat category by the national Vertebrate Pests Committee (VPC). New species not previously held in Australia will be assigned a threat category using the same risk assessment models during the Live Import Listing Process. South Australia then assigns a minimum level of risk management conditions to each species within these threat categories via the conditions of permit for entry and keeping. Permits are issued under the provisions of the *Natural Resources Management Act*.

Gaps in the current process are the potential failure to capture the importation of hybrids between species currently on the permitted or exempt import list and new species not in Australia. South East Asian sub-species (and hybrids) of Australian native species also can be issue through misidentification (eg *Eclectus* parrot). These issues were identified at a DEWHA stakeholder workshop in Canberra in August 2008.

Fish:

Section 78 of the *Fisheries Management Act 2007* provides that it is an offence to release certain fish (unconfined) into natural waters. This includes any exotic fish, any farmed fish or any fish that has been kept from their natural habitat. The Executive Director, Fisheries, upon application by any person, may issue a permit authorising the person to release fish of a prescribed class into specified waters.

PIRSA Fisheries has also prepared a policy to provide a transparent means for assessing applications for stock enhancement. The policy is risk based but is based on the premise that stock enhancement is not the preferred response in relation to declines in fish stocks and that a precautionary approach must be taken in assessing applications for stock enhancement. A precautionary approach dictates that decisions are guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, social or economic wellbeing. It must include a risk assessment of the weighted consequences of various options and a social assessment and demonstrated attention to the complete ecological and social aspects involved in the exercise.

One major source of freshwater pests is the ornamental aquarium trade in Australia. More than 2,000 exotic species of marine and freshwater finfish, crustaceans, molluscs and plants are traded in this industry. About 200 licensed fish breeders, catchers and importers supply a network of wholesalers that service almost 900 pet shops and specialist aquarium outlets around Australia (O'Sullivan *et al* 2008). Recent studies suggest that approximately 34 exotic freshwater species have established populations in Australia and very little is known of the most effective management and control options for these species or the long term impact on aquatic ecosystems and habitats. A strategic approach to the management of ornamental fish in Australia has been prepared by the Australian Government in association with states and territories. South Australia is proceeding to implement the strategy, which includes a consideration for registration of retailers and hobbyists. Commercial breeders are licensed under the *Aquaculture Act 2000*.

5. Western Australia

The current legislation that deals with the introduction and keeping of exotic species in Western Australia includes the *Agriculture and Related Resources Protection Act* (1976) (ARRPA), administered by the Department of Agriculture and Food (DAFWA) and the *Wildlife Conservation Act* (1950*)* (WCA), administered by the Department of Environment and Conservation (DEC). ARRPA primarily deals with species that impact on agriculture protection while WCA deals with species that impact on conservation values.

[The *Biosecurity and Agriculture Management Act 2007* (BAM Act) will eventually supersede ARRPA, and will deal with both border and post-border biosecurity across the triple bottom line.]

Administrative process

The introduction and keeping of exotic terrestrial vertebrates in WA involves their management across the triple bottom line. This is done primarily using ARRPA and WCA through the WA Committee for the Introduction and Keeping of Animals (CIKA)[4] and always in keeping with policy developed by the Vertebrate Pests Committee (VPC)[5]. Day-to-day CIKA business is carried out by a Technical Sub-committee co-ordinated by DAFWA.

All exotic vertebrates known to be in the state, either in the wild or in private hands, are listed under ARRPA in a Declared Animals List (http://www.agric.wa.gov.au/content/PW/VP/declared_animals.pdf). Those requiring management are declared as pests and assigned to management categories relating to import, keeping and control of animals at large. (The keeping categories are based as much as possible on VPC categories.) All vertebrates not specifically listed are automatically prohibited.

When an application is received which would require a change in the assigned management categories, the procedure outlined in the flow diagram below is carried out.

Details of risk assessment process

The risk assessment models developed by Dr Bomford (Bomford 2003[6], 2006[7]) are used to assess risk posed by exotic vertebrates to Western Australia. Birds, mammals, reptiles and amphibians are assessed using the updated bird and mammal model (Bomford 2006), pp 30-39. In addition to this assessment, all reptiles and amphibians are assessed using two other assessments: the updated reptile and amphibian model (pp 58-60) and the alternate bird and mammal model for reptiles and amphibians (Bomford 2008[8]), pp 54-56. The highest ranked outcome is used (Bomford 2006).

A literature review is conducted using: library databases (Zoological Records, Biological Abstracts, Medline); general taxonomic and biological reference books; SCIRUS and GOOGLE search engines; Internet database – reptile, IUCN; List-servers like Aliens. References are managed using Endnote software. Information supplied by an applicant is also considered, where appropriate.

The climate analysis is adjusted for a comparison of the climates of WA and the species' overseas range, otherwise the risk assessment method used is identical to the published models. The data generated by the WA analysis is entered into the model.

Draft risk assessments are reviewed by DAFWA peers and the Technical Sub-committee (CIKA).

Limitations that are taken into account include: potential for bias of information supplied by stakeholders, consistency in interpretation and answering of the model's questions by the assessor, the level of technical skill of assessor, superficial and inadequate literature searching, and limitations of the climate analysis.

4: A Cabinet-appointed committee, comprising representatives from DAFWA, DEC, Department of Fisheries, AQIS and Perth Zoo with assistance from the Department of Local Government and Regional Development and the RSPCA when required. The Committee was established to oversee the interests of the various government departments involved, ensuring that risks to agriculture and the environment from exotic vertebrates were minimised as a result of decisions made.

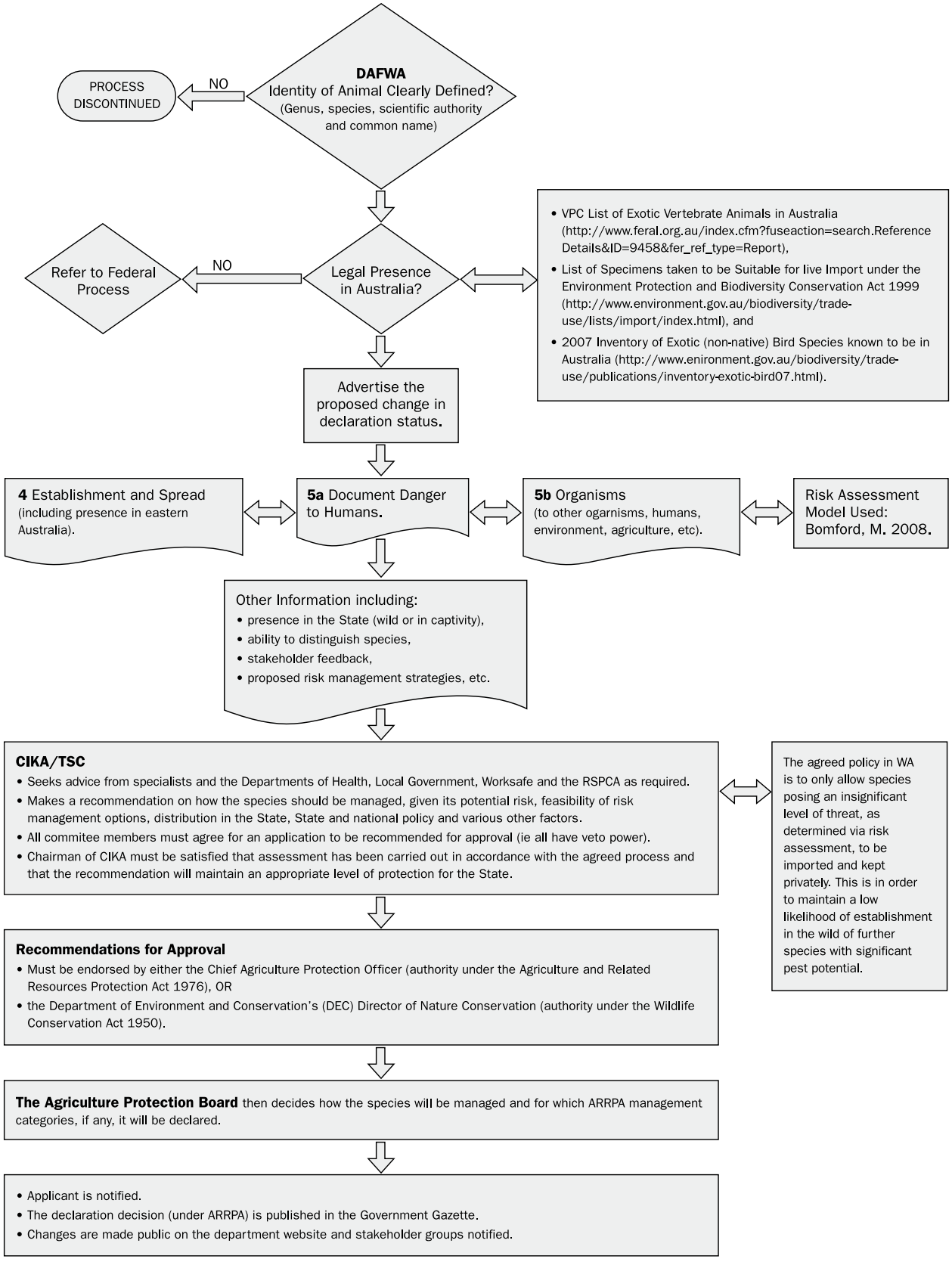
5: VPC operates in accordance with Terms of Reference defined by the Natural Resources Management Standing Committee (NRMSC) and reports to it through the Natural Resources Planning and Policy Committee (NRPPC). Each state and territory, the Australian Government, New Zealand, CSIRO, and the Invasive Animals CRC have membership on the VPC.

6: Bomford, M. (2003). 'Risk Assessment for the Import and Keeping of Exotic Vertebrates in Australia.' (Bureau of Rural Sciences: Canberra.)

7: Bomford, M. (2006). Risk assessment for the establishment of exotic vertebrates in Australia: recalibration and refinement of models – A report produced for the Department of Environment and Heritage (pp. 130): Bureau of Rural Sciences.

8: Bomford, M. (2008). Risk assessment models for establishment of exotic vertebrates in Australia and New Zealand – A report produced for the Invasive Animals Cooperative Research Centre: Bureau of Rural Sciences.

DAFWA ADMINISTRATIVE PROCESS



6. Tasmania

As an island state Tasmania has a natural advantage in its ability to maintain a relatively pest, disease and weed free status. This status allows Tasmania to trade in markets closed to other producers, reduces production costs and sets the state apart as a natural and quality producer and destination.

This high biosecurity inherently gives us the responsibility to protect our natural biodiversity from introduced animals that have the potential to impact on Tasmania's natural status, and protect our endemic species from competition/predation that may result if exotic animals inadvertently enter our natural environment.

The major legislation involved in the control of the import and export of vertebrate fauna into Tasmania are the *Nature Conservation Act 2002* and the *Animal Health Act 1995*; both Acts are administered by DPIW. The Animal Health Act is generally to restrict animals entering the state in relation to production animal health while the Nature Conservation Act is primarily concerned with biodiversity conservation.

For the vast majority of imported animals an import permit is required under the Nature Conservation Act and/or a special authority under the Animal Health Act. Under each Act there are lists of exempt species that do not require any import authorities. No permit is required under the Nature Conservation Act to bring invertebrates into Tasmania even if they pose an environmental risk.

Risk Assessment Process

In 2008 an Import Assessment Panel was established to assess all (non-exempt) species prior to importation. The panel meets quarterly to assess import applications. The Import Assessment Panel assesses import applications according to the potential risk to Tasmania in relation to biodiversity, effects on specific species of native fauna, security of the introduced species (risk of escape), wildlife diseases, domestic animal diseases, primary production, and public safety.

Applicants are required to provide the panel with detailed information pertaining to the assessment criteria.

Assessments are sector based (eg Exhibition Permit holders/Herptoculture permit holders/ general public) and are not made on an individual case by case basis. As species are assessed they are added to a list of Controlled Animals suitable for import and appropriate sector usage is assigned. Those species not considered appropriate for import are added to a list of Controlled Animals that are considered to be a high risk and which would not be considered for importation.

The panel consists of various experts within DPIW and membership is not made public to prevent lobbying of panel members by stakeholders.

Once in the state there are a number of permitting controls that are used to control the use of the animals. However, this does not cover bird species where there are no naturally occurring populations found in Tasmania.

7. Australian Capital Territory

Animals are covered under the *Nature Conservation Act 1980*. The following points are conditions for the importation of exotic vertebrates into the A.C.T.:

- Licence is subject to the approval of other relevant state/territory authorities and authority to export.
- The Conservator of Flora and Fauna shall be notified within 48 hours of the death or escape of any animals or any disease outbreak.
- The licence and any records required to be kept must be available for inspection by the Conservator of Flora and Fauna or any Conservation Officer.
- Imported species shall be observed for possible disease outbreaks for a period not less than 72 hours.
- The holder of the licence shall notify the Conservator of Flora and Fauna within 14 days of expiry date if no animal is imported.

Risk assessment is governed and enforced by the above listed conditions. Failure to comply with these conditions may result in prosecution action or cancellation of the licence under the *Nature Conservation Act 1980*.

No particular scientific models are used for risk assessments — assessors just use their own judgement.

Applications are assessed using the following factors:

- the animal's conservation status; whether they are on CITES or Schedule 2 of EPBC Act
- the animal's source and suitability for captivity
- the applicant's expertise
- the suitability of location and housing facilities
- purpose for keeping
- overall value to the community as a whole
- use of any progeny
- disposal, microchipping etc
- environmental effect any escaped or released individuals of the species may have on existing species or ecosystems in the A.C.T. or Jervis Bay Territory.

Further criteria are set by the Minister and include:

(a) species having special protection status
(b) protected native animals and protected native plants
(c) other native animals and native plants
(d) prohibited organisms and controlled organisms
(e) any other animals, plants, fish and invertebrates.

8. Northern Territory

The risk assessment process in Northern Territory is quite simple: potential importers apply for a permit to import and it is assessed relying on expert knowledge. There are not many requests to import into the state. At present no formal risk assessment model is used.

9. Australian Government: DEWHA

Environmental Assessment Process for amending the live import list to include a specimen under the *Environment Protection and Conservation Biodiversity Act 1999*

Assessment process

Please refer to attached flow-chart for the full DEWHA process.

DEWHA have undertaken a review of the Terms of Reference and have developed standard Terms of Reference for biological control agents and non-biological control agents. The Terms of Reference provide the applicant with a mechanism for preparing a report to allow for a risk assessment to be undertaken. The Terms of Reference must be addressed to the satisfaction of the department before an application can proceed. A copy of the standard Terms of Reference can be found below.

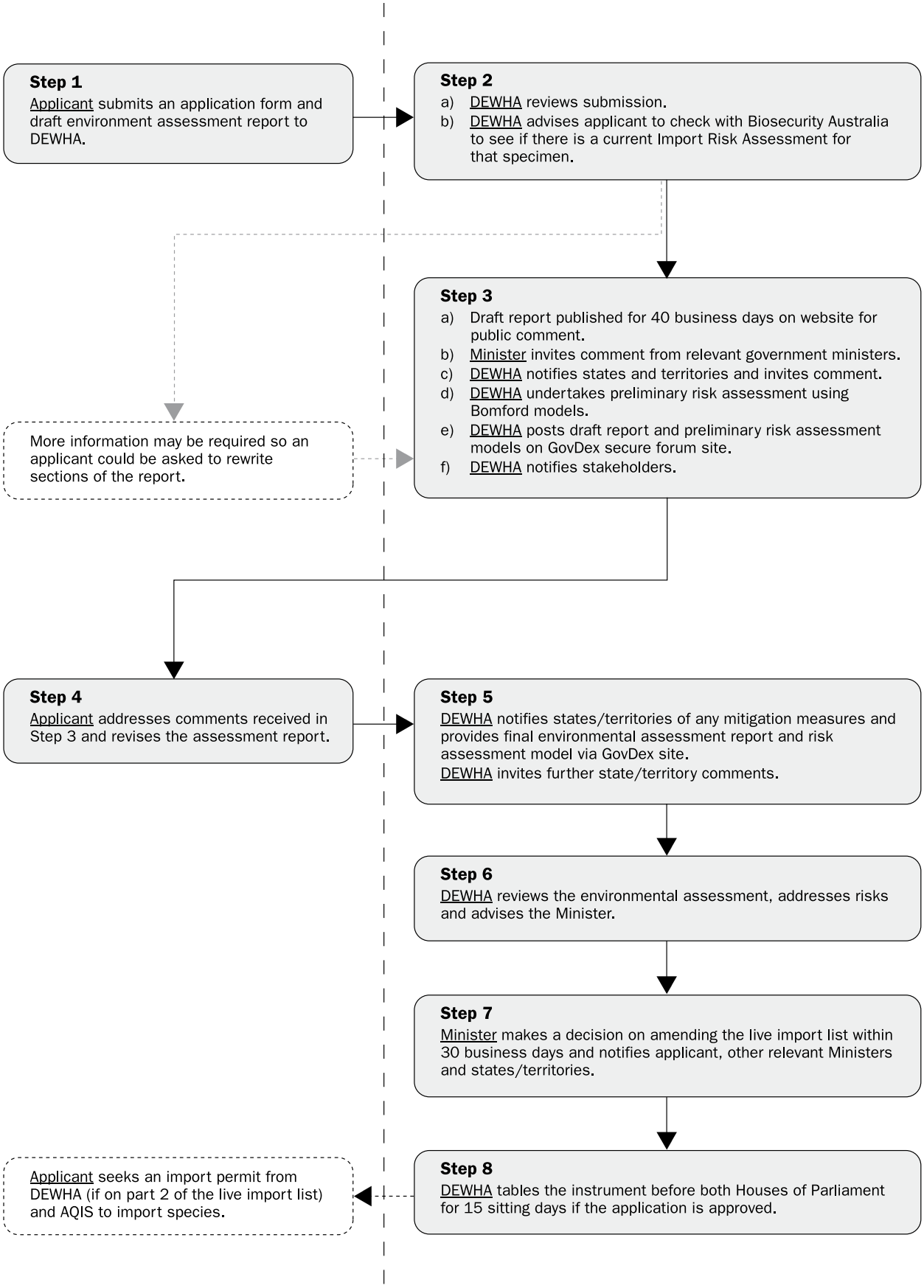
DEWHA have developed and released guidelines to assist the applicant with addressing the Terms of Reference (see below). The information provided in the guidelines outlines the areas of concern that the applicant should address when preparing a report. DEWHA have attempted to encourage the applicant to include information on areas which have commonly been queried either by the department or by the states and territories in the past.

In cases where DEWHA decides that the Terms of Reference have not been adequately addressed within the report, DEWHA has the ability to request that the applicant provides additional information. DEWHA will only progress an application where it feels that the applicant has sufficiently addressed the Terms of Reference.

Factors taken into consideration for decisions

- State and territory comments
- Public comments
- Bomford risk assessment model outputs and climate modelling
- Purpose of importation
- Mitigation options
- Other ecological factors which may assist in establishment of the species
- Whether the species is terrestrial or non-terrestrial (Climate matching only accurately provides outputs for ambient and above-surface terrestrial climatic factors)
- Whether the species is considered noxious in any Australian state or territory or is for review of being noxious eg the ornamental fish "grey list".
- Precautionary principle as outlined in section 391 of the EPBC Act.

EPBC Act Live Import Listing Process



DEWHA terms of reference — Non-Biocontrol

1. Provide information on the taxonomy of the species.
2. Provide information on the status of the species under the *Convention on International Trade in Endangered Species of Fauna and Flora* (CITES). For example, is the species listed on CITES Appendix I, II or III, and if so, are there any specific restrictions on the movement of this species? Include information on the conservation value of the species.
3. Provide information about the ecology of the species. Include, but do not restrict your response to:
    - lifespan of the species
    - size and weight range
    - the natural geographic range
    - habitat
    - diet, including potential to feed on agricultural plants
    - social behaviour and groupings
    - territorial and aggressive behaviours
    - natural predators
    - characteristics that may cause harm to humans and other species
4. Provide information on the reproductive biology of the species, including
    - the age at maturity (first breeding)
    - how frequently breeding occurs
    - if the female can store sperm
    - how many eggs or live-born young are produced at each breeding event
    - if the species has hybridised with other species (both in the wild and in captivity) or has the potential to hybridise with any other species
    - if the species can hybridise, are the progeny fertile
5. Provide information on whether this species has established feral populations, and if so, where those populations are. Include information on whether this species has been introduced to other countries, even if it has not established feral populations.
6. Provide information on, and the results of any other environmental risk assessments undertaken on the species both in Australia and overseas, including any Import Risk Analyses undertaken by Biosecurity Australia.
7. Assess the likelihood that the species could establish a breeding population in the Australian environment should it ever be released from effective human control. Include at least the following factors:
    - ability to find food sources
    - ability to survive and adapt to different climatic conditions (eg temperatures, rainfall patterns)
    - ability to find shelter
    - rate of reproducing
    - any characteristics that the species has which could increase its chance of survival in the Australian environment

8. Provide a comprehensive assessment of the potential impact of the species should it establish feral population/s in Australia. Include, but do not restrict your assessment to the impact of this species on:
    - similar niche species (ie competition with other species for food, shelter etc)
    - is the species susceptible to, or could transmit any pests or disease
    - probable prey/food sources, including agricultural crops
    - habitat and local environmental conditions
    - any control/eradication programs that could be applied in Australia if the species was released or escaped
    - any characteristic or behaviour of the species which may cause land degradation ie soil erosion from hooves, digging
    - any potential threat to humans
9. What conditions or restrictions, if any, could be applied to the import of the species to reduce any potential for negative environmental impacts (eg single sex imports, desexing animal prior to import etc)
10. Provide a summary of the types of activities that the specimen may be used for if imported into Australia (eg pet, commercial, scientific). You must discuss:
    - the benefit of this species for these activities
    - potential trade in the species
    - why this species has been chosen
11. Provide detailed guidelines on the way in which the species should be kept, transported and disposed of in accordance with the types of activity that the species may be used for if imported into Australia. You must include:
    - the containment (eg cage, enclosure) and management standards for this species to prevent escape or release. This should also talk about the security standards for this specimen
    - the disposal options for surplus specimens
12. Provide information on all other Commonwealth, state and territory legislative controls on the species, including:
    - the species' current quarantine status, or
    - pest or noxious status, or
    - whether it is prohibited or controlled by permit or licence in any state or territory

DEWHA guidelines for import applicants

These guidelines have been written to assist applicants (proponents) in completing an application to amend the List of Specimens Suitable for Live Import (live import list) under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) to include a new species/specimen.

The following document outlines the application processes conducted by the Department of the Environment, Water, Heritage and the Arts (DEWHA), and describes the requirements and minimum information needed to adequately assess the impact of importing this species.

Application

These guidelines are written in accordance with Sections 303EC, 303EJ and 303EF of the EPBC Act. To apply for any vertebrate or invertebrate animal specimens (excluding biocontrol agents) to be included on the list of specimens suitable for live import it is necessary to complete the application form and draft risk assessment report, and return it to DEWHA.

The draft report must include an assessment of the potential impacts of the species on the Australian environment. Applicants may complete this assessment themselves or may wish to employ a suitable consultant.

Terms of Reference

Terms of reference (ToR) are a list of questions to be addressed in the environment assessment report. The purpose of the ToR is to assess the potential impact that a species may have on the Australian environment. The environment assessment report enables the Minister to make a decision on the species proposed for import, based on a thorough assessment of the potential risks to the environment.

Inclusion of a species on the live import list means that anyone can then import it, not just the proponent. It is very important therefore for DEWHA to assess all potential environmental impacts despite the nature of the proponent's intended import.

Environment as defined in the EPBC Act includes:

(a) ecosystems and their constituent parts, including people and communities

(b) natural and physical resources

(c) the qualities and characteristics of locations, places and areas

(d) the social, economic and cultural aspects of a thing mentioned in paragraph (a), (b) or (c).

All terms of reference must be addressed in the draft report for it to be processed. Additional information not included in the ToR's may be included if the applicant chooses.

Environment Assessment Report

As discussed, the Terms of Reference identify the issues that must be addressed in the risk assessment report. It is strongly recommended that the Terms of Reference be used as subject headings in the report. This will ensure that all of the information required by the Minister to make a decision is clearly incorporated within the report.

The draft report is published on the department's website for 40 business days and stakeholders are invited to provide comments. At the same time, the Minister contacts the relevant Commonwealth, state and territory ministers advising them of the publication of the report and inviting their comments. The Minister may also consult with other organisations or individuals before making a decision to amend the list.

At the end of the consultation period the department collates all comments received from stakeholders, and the Commonwealth, state and territory ministers, and forwards them to the applicant. Relevant comments must be incorporated by the applicant in the final report.

The Minister will make a decision about the proposed amendment based upon the final report and the outcomes of the consultation.

If the Minister does not approve an amendment to add the species to the live import list, the import of the proposed species will remain prohibited. Where this occurs, the applicant will be advised in writing of the decision.

The following are a few points to assist you with preparing and presenting the report:

- The report should be researched and presented in a clear and professional manner. It must comprehensively address each of the Terms of Reference.
- All stated information should be fully referenced in a clear and appropriate manner. It is important that claims in the report are based upon scientifically sound information. Where information is lacking, any reference to this in published literature should also be noted.
- Where it is not possible to obtain information from published literature, information published through more informal media, such as the internet, can be included in the report. Information obtained from these sources must be cited. For example, the web site address should be cited after the relevant information.
- While the applicant is responsible for preparing the report, they have the option of employing a suitably qualified consultant to undertake the actual research and writing.

Report Contents

1. Provide information on the taxonomy of the species

The following information is required about the taxonomy of the species and its role in its natural environment:

a) Family name: Identify which family the species belongs to.

b) Genus name: Identify which genus the species belongs to.

c) Species: Identify the species.

d) Subspecies: Are there any recognised subspecies, and if so, what subspecies does the proposed specimen for import belong to?

e) Taxonomic Reference: (eg Axelrod, page no., illustration page no.).

f) Common Names: Note what common names the species is known as (if any).

For example, the Plains Zebra (common name) is known scientifically as Equus burchelli, where 'Equus' is the genus and 'burchelli' is the species. Zebras belong to the family Equidae.

g) Is the species a genetically-modified organism (GMO)? Identify if the species has been genetically modified. If the species has been genetically modified or engineered, you will need to contact the Office of the Gene Technology Regulator (www.ogtr.gov.au) before proceeding with this application.

2. Provide information on the status of the species under CITES

The Convention on International Trade in Endangered Species of Fauna and Flora (CITES) is an international treaty involving over 150 countries with the purpose of protecting wildlife from unregulated trade. Australia, as a member country, controls the import and export of species that are threatened or could become threatened due to trade in them or their products.

A species may be affected in its natural environment by factors such as habitat destruction and fragmentation, and illegal collection for a variety of purposes eg for the pet industry. To help mitigate the threat of collection and trade, the species could be listed in the CITES Appendices. A species on CITES Appendix I or II requires appropriate CITES import permits to enter Australia.

If the proposed species for import is listed on CITES Appendix I or II discuss as appropriate:

- the implications of illegal trade
- popularity of the species in trade eg pet industry
- status of species in its natural range eg threatened, endangered, protected etc
- why is this species threatened?

CITES listing is taken into account when considering restrictions in countries outside the species' natural range.

3. Provide information about the ecology of the species

These characteristics may influence the likelihood of the species to establish feral populations

a) Longevity: what is the average lifespan of the species in the wild and in captivity?

b) What is the maximum length and weight that the species attains? Provide information on the size and weight range for males and females of the species.

c) Discuss the identification of the individuals in this species, including if the sexes of the species are readily distinguishable, and if the species is difficult to distinguish from other species.

   Where possible provide representative photographs of female and male specimens at all life stages. Ensure you have appropriate copyright permission as the report will be published on the department's website.

d) Natural geographic range. What is the country of origin and what is the natural distribution of this species? Where does the species occur naturally? Exclude any areas where the species has been introduced through human intervention. Describe any population limiting influences in its natural range including: predator/prey relationships, competition, availability of resources etc.

e) Is the species migratory? Identify if the species moves seasonally between different habitats. Migratory behaviour may occur between countries, within one country, or may occur on a small scale, for example from high altitudes to low altitudes on a mountain range.

f) Does the species have the ability to hibernate in winter or aestivate (go into stasis or torpor) in the summer months)?

g) Does the species have the ability to breathe atmospheric air ie has accessory breathing organs? (fish and other mobile aquatic animals).

h) Habitat Requirements. Outline the habitat requirements for all life stages of the species:

   - physical parameters (eg salinity, oxygen, pH, temperature) of the natural habitat
   - climate
   - What nest sites can the species use? 'Nest' is taken to mean a specific area individuals return to in order to sleep, bear or rear young. Identify where the species does/can nest. For example tree hollows; burrows; caves; buildings; cliff faces; dams, lake, pond marsh, swamp, reed-bed; particular ground surface; particular vegetation type; other (specify).
   - Does the species nest, shelter or feed in or around any of the following habitats? Marshes or swamps; estuaries, lakes, ponds or dams, rivers, channels or streams, banks of water bodies; coastal beaches or sand dunes (specify). This question seeks to identify if the species could impact on habitat(s) listed.

i) Social behaviour or groupings. Describe how the animal would naturally dwell, for example in social groups, pairs, solitary; animals may be predominantly solitary except during breeding seasons etc. How does the species behave towards its own kind and other species?

j) Is this species ever territorial or does it exhibit aggressive behaviour? Is the species naturally territorial? If so, what would the natural territory range be? Identify whether this species has ever acted in an aggressive manner towards other species, including humans, outside of any usual predator-prey interactions.

k) Characteristics that may cause harm to humans or any other species. Is the animal capable of inflicting harm? A response for this question would arise if the species has organs such as teeth, a bill, spines or claws that are capable of causing injuries to people that are more significant than minor cuts or bruises.

4. Provide information on the reproductive biology of the species

Assess and describe the reproductive characteristics of the species

a) At what age does this species reach sexual maturity (males and females)?

b) Discuss the species' ability to reproduce; triggers for breeding; breeding site requirements.

c) How frequently does breeding occur?

d) For sessile aquatic invertebrates include details of:

the length of time spent as motile larvae or plankton growth patterns (eg is it colonial or does it grow as a solitary animal) characteristics or behaviour that enable the species to survive drought, or other adverse conditions (eg forming cysts or spores).

e) Can individuals of the species change sex? (reptiles, amphibians, fish and other mobile aquatic animals)

f) Ability of the species to hybridise. Describe any known crosses. Are progeny of such crosses fertile?

g) Could the species hybridise with any Australian native species? Identify whether the species could negatively impact native species through hybridisation (cross-breeding with native species).

h) Are individuals single sexed? (ie either male or female) or hermaphroditic (ie have both male and female reproductive organs)

5. Provide information on whether this species has established feral populations

a) Has this species ever established a breeding population outside of its native range? Identify any areas where this species has established a breeding population outside of its natural range.

b) Is the species considered a pest anywhere in its natural or introduced range? A pest is a species of animal that causes wide-scale economic cost or amenity loss through its presence or activities. Identify whether this species is subject to active management to reduce population numbers.

c) Has the species been introduced to other countries, even if it has not established feral populations?

6. Environmental risk assessments of the species

Have any risk assessments of the species, or similar species been carried out in Australia or overseas? Include the results of those assessments in the report.

7. Assess the likelihood that the species could establish a breeding population in Australia

The following points outline the information required for determining the likelihood that the species could establish and inhabit possible matches in the Australian environment.

a) Ability to find food sources. Is the species a generalist feeder or does it have specific food needs? What is the likelihood of it finding food in Australia if it was released or escaped? Describe the feeding characteristics of the species, including whether it has a similar diet to any Australian native species.

b) Ability to survive and adapt to climatic conditions. Describe the characteristics or behaviour that would enhance its ability to survive extreme climatic conditions (eg drought) and its ability to adapt to different environments.

c) Ability to find shelter. Can the species live in modified habitats? Identify if this species can live in habitats that have been modified by humans, either directly or indirectly, eg example plantation forests; gardens; orchards; vineyards; crops; cities or towns; buildings; improved pastures; dams, channels or drains; other (please specify).

d) Reproduction. Could factors such as longevity, birth rates and numbers of offspring increase the likelihood of the species to establish?

e) Are there any limiting influences on the species' natural range? Predator/prey relationships, competition, availability of resources etc. Assess what similar population constraints might exist in Australia.

f) Address the issue of increased potential for feral population establishment if more individuals of the species were present in Australia.

8. Provide a comprehensive assessment of the potential impact of the species should it become established in Australia

Summarise the potential impact on the environment of importing the specimen. Address both the potential impacts of the particular import that is proposed, and the potential impacts of the species should the specimen(s) ever be released from effective human control.

It is important that a full explanation and comprehensive analysis, including the costs and benefits, of each aspect is undertaken.

An application will not be continued if information provided in this section is inadequate.

a) Does the species have similar niche/living requirements to native species?
   - Could wild populations of the species use the same resources as native Australian species, for example that it would compete with for food, shelter etc.
   - If 'yes', what types of resources could be used and which types of Australian native species could be affected: food; water; space; rest or shelter sites; nest sites; other. What native species would be affected?
   - If the species you are proposing to import is a mammal, identify if it can climb trees.

b) Probable prey/food sources
   - Does the species attack or prey on wildlife? Identify if the species has the capacity to attack or prey on wildlife. If 'yes', specify whether the prey are: waders or waterfowl; other birds; mammals < 1 kg; mammals 1–5 kg mammals > 5 kg; amphibians; vertebrate eggs; fish; aquatic invertebrates; reptiles; insects; land invertebrates; other; (specify).
   - Does the species attack or prey on domestic or commercial animals or plants?

c) Impacts on habitat and local environments.

- Could the species reduce the ground vegetation cover to an extent where it could cause or increase soil erosion? This question looks at identifying if the species, through feeding, digging or other activities could have a detrimental impact on vegetation such that the underlying soil is exposed to increased erosion.
- Does the species construct burrows or dig near or around waterways? Identify if the species does/can burrow or otherwise disturb the substrate (soil or sand) around waterways.
- Has the species ever been recorded causing damage to: native animals' habitats; natural communities; native plants; forestry; agriculture?
- Could the species inhibit tree seedling regeneration in forests and woodland? This question aims to identify if the species could have a negative impact on regeneration in native forests and woodlands.
- Could the species spread weeds? Identify whether the species could spread weeds through carrying seeds on their fur/feathers, defecating the seeds at a distance from the parent plant or moving viable vegetative matter to new areas.

d) Behaviours that cause environmental degradation

- Behavioural characteristics. Describe any behaviours of the species which cause physical disturbance to the environment eg hooves, digging etc.
- Does the species eat or disturb wetlands/wetland vegetation? This question seeks to identify negative impacts the species may have on wetlands.
- Could the species cause pollution of water bodies? This question seeks to identify if the species could impact native aquatic flora or fauna by polluting waterways.
- If possible, outline the current health of the possible habitat matches in Australia and analyse their sensitivity to possible introductions from the species being assessed.

e) Impacts on primary industries

- Has the species ever been recorded causing damage to: livestock, poultry, agriculture?
- Could a wild population of the species eat or damage any of the following: plant parts or products; flowers or buds; nuts; root vegetables; leaf vegetables; sugarcane; fodder crops; cotton; nursery/garden plants; timber forests or plantation trees; fruit orchards; stored grain or seeds; legumes; cereal grain in field; oilseeds or coarse grains in field; other (specify).
- Could wild populations of the species use any resources that might cause it to compete with livestock? This question seeks to identify if this species could compete with livestock.
- Has the species ever inflicted damage to trees, shrubs or their seedlings that has caused tree death or affected their value as timber? This question aims to identify if the species may have a negative impact on tree plantations/silvicultural activities.

f) Damage to property

- Could the species deface or physically damage buildings? Identify if the species could damage buildings either through physical damage, or through depositing excrement on the exterior of the building.
- Could the species damage fences? Identify if the species has the capacity to damage fences.
- Could the species damage equipment? Identify if the species could cause damage to domestic or commercial equipment.

g) Is the species a social nuisance or danger? For example because of the following behaviours: invading buildings; forming large noisy colonies or flocks; polluting equipment, buildings, parks or other public facilities with urine, droppings or nesting material; posing a risk to aircraft when present in flightways or at airports; other (please specify).

h) Describe any potentially harmful characteristics of the species.

- Any potential threat to humans, any available mitigation measures (such as anti venom), and methods for appropriate handling.
- Has the species ever injured people? Identify whether there are any recorded instances of this species causing harm to people.
- Is the species susceptible to, or could it transmit any pests or diseases? Identify if the species could potentially transmit harmful diseases or parasites to humans or any other species.

9. What conditions or restrictions could be applied to reduce any potential negative impacts of the species?

- Discuss any control/eradication programs that could be applied in Australia if the species was released or escaped. Are any such eradication programs already available in Australia?

10. Summary of proposed activity

What is the proposed purpose of the import? Specify the reason you want to import the species. This may be for eligible non-commercial purposes such as research, education, exhibition, conservation breeding, household pet or travelling exhibition, or for commercial purposes. Where appropriate discuss:

- The rationale for choosing to import this species into Australia.
- Clearly state the numbers of animals you want to import.
- Discuss the interaction between males of this species. Do they need to be segregated?
- If the purpose is for breeding discuss the management and control of excess progeny in the breeding program. How many animals will be kept at any time on the premises? How will lack of genetic variation be managed in the breeding program?
- Discuss any other potential uses for this species should it be imported into Australia. Where applicable, describe its human uses (eg zoos, research, pets etc).
- Provide details on where animals are obtained, eg captive bred populations or from the wild.

11. Guidelines on how species should be kept

As appropriate discuss the following issues:

- What are the standards for transporting animals? Will the animals be transported according to International Air Transport Association (IATA) regulations?
- How does enclosure size relate to territory requirements?
- Discuss the containment and management standards for Australia eg the proportion of males to females and the maximum number that should be kept in enclosures/aquaria. Also if single sex populations would be contained within enclosures to limit breeding etc.
- What standards are used for the enclosures/aquaria in which this species would be kept? What are the best practice standards? Who applies these standards? Will enclosures/aquaria be sufficiently large enough for the humane containment of the animals? For example providing sufficient depth and length?
- Address welfare issues in housing captive specimens.

12. State/territory controls

Outline any Commonwealth, state, or territory legislative controls on the species and provide information on any other relevant assessments that have been made of the species.

As each state and territory of Australia has different legislation regarding legally keeping different species, and some states/territories prohibit keeping certain animals, therefore please check what the restrictions each state/territory imposes.

Are you aware of quarantine requirements for bringing live animals into Australia? Is the species you are proposing to have added to the live import list allowed to be imported under the Quarantine Act 1908? Does an import permit need to be obtained from AQIS?

If not, contact Biosecurity Australia to discuss the undertaking of an Import Risk Analysis (IRA) by telephone on (02) 6272 3933 or visit their website for more information at www.BiosecurityAustralia.gov.au

13. Conditions/restrictions

Conditions may be suggested that would reduce the impacts of importing the specimen on the Australian environment. If the outcome of the assessment is that the specimen can be imported subjected to conditions, it will be placed on Part 2 of the live import list (ie the regulated part of the list).

Recommended conditions should be relevant to the conservation status of the species and/or the risks posed by the import. Conditions should mitigate the likely establishment and impact that a species may have.

Workshop Proceedings: Risk assessment processes for import and keeping of exotic vertebrates

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