Report of the Review of the Management of Biosecurity Risks associated with the Importation and Release of Biological Control Agents

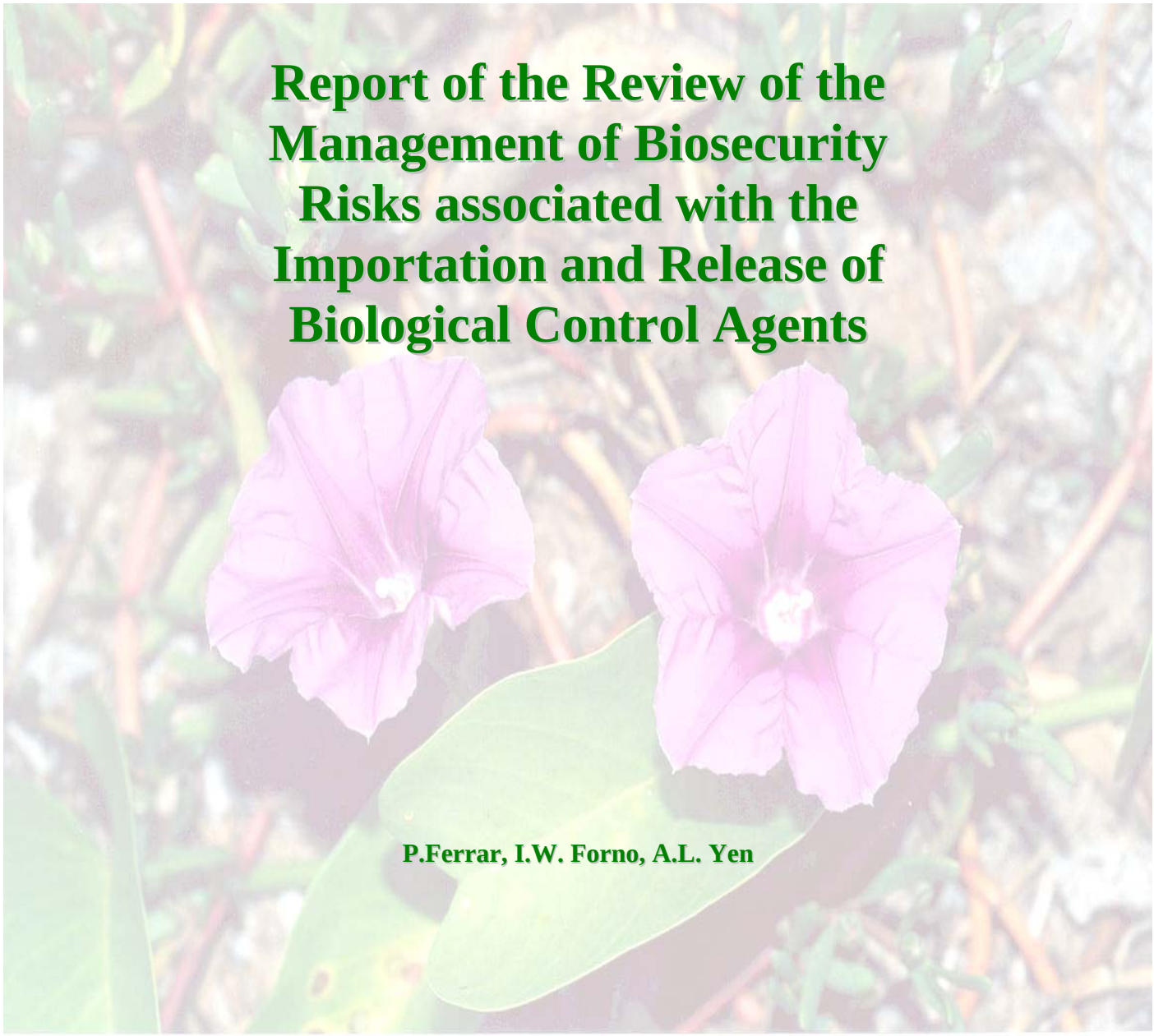

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Table of Contents

Summary and Recommendations 7
1. Introduction 10
    Origin of the Review 10
    Terms of Reference for the present Review 10
    Review Team 11
2. Summary of Applicable Legislation 11
3. What is Biological Control? 11
    Classical biological control 12
    Inundative biological control 12
4. Is biological control supported in Australia? 12
5. Issues associated with classical biological control 13
    Search overseas for control agents 14
    Importation of control agents into quarantine in Australia 14
    Host specificity testing in quarantine 15
    Release of approved control agents from quarantine 16
Assessment of biological control applications and the issue of permits 17
    Overall management of biological control import and approval processes 21
6. Concluding remarks: Biosecurity versus ease of biological control operations – getting the balance 22
7. Acknowledgments 22
8. List of Acronyms 22
Appendices 23
    Appendix 1: List of people contacted by the review 23
    Appendix 2: Sample Reviewer's Comment Sheet as used by USDA 26

REPORT OF THE REVIEW OF THE MANAGEMENT OF BIOSECURITY RISKS ASSOCIATED WITH THE IMPORTATION AND RELEASE OF BIOLOGICAL CONTROL AGENTS

Summary and Recommendations

Biological control is a major means of controlling exotic pest species including weeds in Australia. When conducted according to sound scientific principles it is a very safe practice, both from a biosecurity and an environmental point of view, and it is very cost effective. Australia has a long and distinguished record of biological control, and we found a widespread view that this should continue. No major criticisms were made by respondents, and changes recommended were in the nature of fine tuning rather than radical change.

It is widely felt that a key factor that has kept biological control as safe as it has been is the professionalism and experience of the staff involved – both the practitioners and those who regulate and monitor the procedures. Many respondents saw reduced funding and reduced duration of funding, with the consequent reduction of experience and commitment, as a significant threat to the future safety of biocontrol. Those conducting biological control must understand the ecology of the systems that they are manipulating, and how to avoid importing unintended organisms with control agents. Those assessing applications, reviewing host specificity data and maintaining overall management of the practice, must be equally expert. The necessary depth of expertise takes time to acquire, and it is very important that there is continuity of staff in these areas of work.

Some recommendations for fine tuning of the procedures and practices are made below. Attention to these, and continuing provision of adequate financial and human resources, will ensure that biological control remains a key method for controlling exotic pests in Australia, to the all-round benefit of the nation.

Recommendations

Support for biological control in Australia

Recommendation 1. We recommend that biological control continues to be a major means of control of exotic pest species including weeds in Australia. We further recommend that to maximize the safety of the procedure, adequate financial and human resources be made available by those agencies funding biological control projects.

Search overseas for control agents

Recommendation 2. Biological control practitioners be encouraged to undertake a thorough study of the target pest and its potential biological control agents in the country of origin before any importation of an agent to Australia is made. In

particular, they should conduct field and laboratory studies of the host range to minimize the importation into quarantine in Australia of non-specific agents.

Importation of control agents into quarantine in Australia

Recommendation 3. Applications to import biological control agents should specify the method of disposing of host material and packaging, and within what time frame.

Recommendation 4. We recommend that voucher specimens be kept from every importation of biological control agents into Australia, and that these be deposited in a collection as nominated by AQIS.

Host specificity testing in quarantine

Recommendation 5. The reviewers found widespread concern over the current way in which host test lists are developed. The best way to formulate host test lists is likely to remain a contested subject. We recommend that appropriate taxonomists must be involved in the review process for each application.

Release of approved control agents from quarantine

Recommendation 6. Applications to release biological control agents from quarantine should specify exactly what material will be removed from quarantine. Applications should also state that the agents have been reared through at least one generation unless otherwise approved.

Post-release assessment of target and non-target impacts

Recommendation 7. When biological control projects are funded, provision should be made for adequate post-release monitoring of both target and non-target impacts.

Assessment of biological control applications and issue of permits

Recommendation 8. We recommend that possible duplication between the application and evaluation processes of DAFF and DEH be examined, and that actions be taken to minimize it.

Recommendation 9. We believe that the system of cooperators is a vital part of the review process for biological control applications, both from the biosecurity and the environmental safety point of view. It is also a valuable forum for exchange of views between practitioners and those who are concerned about the safety of the processes. We recommend that the group of cooperators should include one representative of an agriculture department and one of an environmental protection agency in each state or territory, together with a representative of each group of practitioners at Alan Fletcher Research Station, Keith Turnbull Research Station and CSIRO.

Recommendation 10. We recommend that a standard proforma accompany applications to release biological control agents when sent to reviewers. One suggested model is the USDA proforma (see Appendix 2).

Recommendation 11. We recommend that the management of import and release approval processes continues to be by someone with a high level of biological qualifications and a sound understanding of all the biological and biosecurity factors involved, and that adequate resources be made available by the Commonwealth for the efficient and safe operation of these processes. We further recommend that ways be sought to give all involved in the processes better feedback on the progress and outcomes of import and release applications.

1. Introduction

Origin of the Review

The Review of Plant Research Biosecurity Protocols by Radcliffe *et al* (2003)[1] only briefly considered those risks managed by institutions involved in the importation and release of biological control agents. However, that review considered this subject to be an issue worthy of further evaluation, and their Recommendation 18 was as follows:

It is recommended that biosecurity protocols for all facilities working with biological control agents address all possible risks and that the quarantine protocols be well documented, widely understood and fully implemented.

Terms of Reference for the present Review

1. Within the broader context provided by the terms of reference of the original Radcliffe review, the review should consider the management of risks associated with the importation and release of biological control agents as a special case.

2. In the first instance, the review should focus on agents that are being considered as potential candidates for the control of invertebrate and weed pests. The review should only consider biological control agents more broadly if such an extension would, on balance, add significantly to the review process within the required timeframe.

3. The review should, as its primary focus, consider how institutions involved in the importation and release of these agents manage the associated biosecurity risks, and in particular, the protocols and processes used. Related issues should be considered to the extent that they influence the way the risks are managed. Such issues could include: the legislative context; the regulatory system; and the approval process.

4. In addition to examining existing management protocols and processes, the review should also consider whether any systemic, cultural or other issues might affect the effective management of risk.

A separate report[2] was commissioned to cover physical standards for containment facilities and the operating practices applying to those facilities, so these matters are not considered in the present review.

[1] Radcliffe, J.C., Catley, A., Fischer, R.A., Perrett, K.G. & Sheridan, K.P. (2003). Report of the Review of Plant Research Biosecurity Protocols. 34pp. Australian Government Department of Agriculture, Fisheries & Forestry, GPO Box 858, Canberra, ACT 2601. ISBN 0 9750223 4 2.

[2] Agostino, A., Clarke, A.R., Grimm, M., Maynard, G.V., McKirdy, S.J., Perrett, K. G. & Roberts, W.P. (2004). Report of the Standards Working Group on the Implementation of the Review of Plant Research Biosecurity Protocols. 160pp. Australian Government Department of Agriculture, Fisheries & Forestry, GPO Box 858, Canberra, ACT 2601.

Review Team

Dr Paul Ferrar FTSE, recently retired as Research Program Manager (Crop Protection), Australian Centre for International Agricultural Research and formerly a biological control scientist.

Dr Wendy Forno, retired from CSIRO Entomology in 1999 where she was Program Leader for Tropical Weed Projects. Experienced researcher in all aspects of biological control of weeds.

Dr Alan L. Yen is Statewide Leader of Invertebrate Sciences, Department of Primary Industries, Victoria. His background is invertebrate ecology and conservation.

2. Summary of Applicable Legislation

Two Australian Government Departments have legislation that applies to biological control imports into Australia – the Department of Agriculture, Fisheries and Forestry (DAFF) and the Department of Environment and Heritage (DEH):

- The operations of DAFF fall under the *Quarantine Act 1908.*
- The operations of DEH fall under the *Environment Protection and Biodiversity Conservation Act 1999*.

One other Act is also relevant – the *Biological Control Act 1984*. This was enacted to provide a means for resolving disputes when one agency wished to conduct a biological control campaign and another agency believed that campaign would harm its interests. The case that triggered the legislation was the project for biological control of the plant *Echium plantagineum* – known as Paterson's Curse to graziers who consider it a weed, but Salvation Jane to beekeepers who consider it a valuable source of nectar at certain times of year. This was a case where the weediness vs. value of the target species was in question. However, the legislation can also be used to resolve cases where a biological control agent is in dispute, with one agency saying that it will attack the target pest and cause no significant damage to non-target species and another saying that there will be collateral damage to non-target species.

Australia, as a signatory to the International Plant Protection Convention, is also bound by the International Standards for Phytosanitary Measures (ISPMs). ISPM 3 is the *Code of Conduct for the Import and Release of Exotic Biological Control Agents*, and thus applies to the present subject. The current version was issued in 1996, and a revision is due in April 2005.

3. What is Biological Control?

Biological control is the use of biological agents, usually arthropods or pathogens as opposed to chemicals, for the regulation of host population densities. Target hosts include insect pests, weeds and diseases. Two types are distinguished – classical biological control and inundative biological control. These are defined as follows:

Classical biological control

Many insects and weeds that are of little or no economic importance in their country of origin become economically important pests when they are introduced to another country without the natural control agents that suppress them in their native range. Classical biological control is the introduction of some or all of these natural enemies to suppress permanently the population of the target host in the introduced range of the pest. Because this involves the introduction of organisms to areas outside their natural range, there are quarantine protocols and assessments of the risks to the environment to be satisfied – for example, will the new introduction attack non-target species? For these biosafety reasons, classical biological control operations were the main focus of this review and were restricted to the introduction of insects and plant pathogens for the biological control of insect pests and weeds.

When successful, classical biological control is self-sustaining. Populations of the target pest are reduced to the point where it is no longer a pest, and the control agent and pest then remain in balance. This is an economically valuable means of control because no further inputs are needed once the balance has been established.

Inundative biological control

This involves mass propagation of a biological control agent and its release into the field, usually on more than one occasion, to control a target pest. Often the organism propagated is native to the country in which it is used – it is simply multiplied to increase its effectiveness. With such organisms quarantine and other biosecurity issues do not arise. Sometimes, however, an organism may be brought in from overseas for inundative control, and then the same biosecurity considerations apply as with classical biological control. Inundative biocontrol is by definition not self-sustaining because inundative releases are needed every time control is required, and the method is thus more costly than classical biological control.

4. Is biological control supported in Australia?

We found overwhelming support for biological control in Australia, from both the practitioners and those concerned with biosecurity. In addition to the ongoing research of CSIRO and State and Territory research laboratories, two Cooperative Research Centres (CRCs) have directed funds to biological control, the Centre for Tropical Pest Management (1991-1998) and the ongoing CRC for Australian Weed Management (1995 to present). Good research combined with client driven agencies such as Landcare will ensure the delivery of biological control to the environment. The Australian Weeds Committee also strongly supports biological control and is looking at its current status and future development in Australia. Properly conducted, biological control is seen as a safe, economical and environmentally friendly means of controlling pests and weeds that may otherwise become rampant in their new environments and be very hard to control. Effective biological control is usually self-sustaining and there may be negligible ongoing costs or it may be integrated with other control options to greatly reduce the overall costs of controlling a pest.

Biological control is more than just going overseas and collecting natural enemies of a pest. To be conducted properly, and therefore also safely, it requires first careful study of the target pest and its potential biological control agents in the overseas country. Carefully selected species are then imported into Australia for host range studies. The researcher must implement all protocols to avoid importing contaminated material into a quarantine facility, must conduct sound host specificity testing before permission for release is sought, and finally undertake a study of the control agents after release to monitor their effects on target and non-target species. It requires good scientists, and these scientists need some years of experience to be able to conduct biological control soundly and safely.

One biosecurity threat indicated to us by a number of respondents is the impact of inadequate funding to assess the host range and the risk of releasing biological control agents. Funding bodies are only prepared to commit funds for a few years, which puts pressure on biological control scientists to cut corners in order to complete studies within funding periods. It also rarely allows for adequate post-release monitoring. A further impact of reduced funding for biological control is the loss of experienced scientists and the short-term recruitment of scientists for the duration of a project. Hence the opportunity for a young scientist to gain many years of experience in biological control operations and gain peer review from experienced scientists in this field is declining rapidly.

Biological control is as safe as it is today because it has been carried out by well qualified scientists with job security allowing them to gain years of experience in how to identify and assess the risks of introducing biological control agents. We believe that it is essential for Australia to maintain this core of ongoing expertise – it will be unlikely that scientists temporarily recruited, project by project, and doing other work between projects will be able to attain the same levels of experience and thus maintain the same levels of safety as exist at the present.

Recommendation 1. **We recommend that biological control continues to be a major means of control of exotic pest species including weeds in Australia. We further recommend that to maximize the safety of the procedure, adequate financial and human resources be made available by those agencies funding biological control projects.**

5. Issues associated with classical biological control

Two types of potential risk are associated with biological control operations:

- the introduction of new organisms to Australia may breach quarantine and biosecurity requirements if shipments accidentally include other species.

- the Australian environment may be harmed if the introduced organisms attack plants or insects other than the target pest.

The risks at each stage of the biological control process, and the precautions taken to minimize these risks, are summarized further below.

Search overseas for control agents

The exploratory phase wherein agents are selected prior to shipment to a quarantine facility in Australia presents no risk. This phase, however, offers a good opportunity for the researcher to investigate the ecological and biological characteristics of any potential agents, including their host range, before they are shipped to Australia. In Australia they can only be investigated and tested for host specificity in quarantine, while in their native range they can be studied in less restrictive field and laboratory trials. Concern was expressed to the Review Team that insufficient research was being conducted overseas prior to selecting organisms for import into quarantine in Australia.

Recommendation 2. **Biological control practitioners be encouraged to undertake a thorough study of the target pest and its potential control agents in the country of origin before any importation of an agent to Australia is made. In particular, they should conduct field and laboratory studies of the host range to minimize the importation into quarantine in Australia of non-specific agents.**

Importation of control agents into quarantine in Australia

Importation requires prior issue of an import permit from AQIS, and a testing permit from the Department of Environment and Heritage. The permit system is described in more detail below (see pp 13-17). Shipments of agents must be prepared by staff with enough training to avoid inclusion of any contaminants – parasites, parasitoids, predators or diseases of the control agent, unwanted hitchhikers in packing material or attached to control agents, etc., and packaging must be of a type to prevent escape of agents during shipment.

The package arrives in Australia together with the permit documentation. It should not be opened by AQIS or Customs at the point of entry, but should be taken by the importer or a reliable carrier to the quarantine facility, and only opened inside that facility. Each quarantine facility is required to have protocols to govern the disposal of packing and any other material to prevent any alien organisms escaping from it. It is also desirable that the control agents themselves be inspected for attached "hitch-hikers" as they are unpacked. Any variation from standard procedures should be approved before an import permit is issued.

Recommendation 3. **Applications to import biological control agents should specify the method of disposing of host material and packaging, and within what time frame.**

Records are kept of all biological control importations into Australia. However, there have been instances in the past where an agent has initially been misidentified, and later there has been confusion as to exactly which species came into this country. It has therefore been a requirement that voucher specimens be placed in an appropriate reference collection (an AQIS collection, since AQIS needs to know for quarantine purposes what insects are present in Australia, and/or a collection accessible to the public).

The requirement to date has been for voucher specimens to be lodged from the first shipment of a particular control agent, but not from subsequent shipments. However, several biosecurity representatives indicated concern to the review panel that in subsequent shipments the shipper may have thought that the same species was being shipped while in fact a different one was sent (particularly where undescribed species designated by a code letter are being shipped). It was suggested that for a complete record of what has entered Australia, voucher specimens should be lodged from **every** importation shipment.

Biological control practitioners argued against this as being unnecessary extra work. However, this review feels that the biosecurity concern is valid and voucher specimens should be lodged from each shipment imported to Australia. An appropriate collection could be nominated by AQIS at the time of issue of the import permit. Within the collection, specimens from biological control importations should be kept separate from the rest of the collection for ease of access, and if necessary the Commonwealth should provide appropriate funding to ensure that these important reference collections are maintained for the public record.

Recommendation 4. **We recommend that voucher specimens be kept from every importation of biological control agents into Australia, and that these be deposited in a collection as nominated by AQIS.**

Host specificity testing in quarantine

The aim of biological control is to use natural enemies that are specific to the target pest and cause no significant damage to any other plant or arthropod under any circumstances. The challenge for researchers when determining the host range of a biological control agent is to test the agent against a list of plants or invertebrates that is scientifically sound yet short enough to be practical. A well-structured list will allow the host range to be confidently determined and the risk to the environment accurately assessed. In the case of weeds, there has been long-term usage of a centrifugal phylogenetic method of selecting plants and this is still the basis on which most host test lists are compiled. A modernization of this method has been proposed and has merit in that it stimulates researchers to regularly examine how plant and invertebrate test lists are compiled.

Various testing procedures have been proposed and used and there is ongoing debate as to whether choice or non-choice testing is the preferred option. Most researchers use a combination of both, depending on the biology and behaviour of the agent being tested. The arguments for using different methods, including field trials in the native range, are well presented in the Proceedings of a Workshop in Brisbane in 1998[3]. In the application to release a biological control agent, it is a requirement to clearly state the methods used to determine the host range of the agent and why the release of the agent does not constitute any risk to non-target species. Approval to release is given

[3]Host specificity testing in Australasia: towards improved assays for biological control. Eds. Withers T.M., Barton Browne L. and Stanley, J. 1999. Papers from the Introduction of exotic biocontrol agents-recommendations on host specificity testing procedures in Australasia workshop, Brisbane, October 1998. 98pp.

by the agencies that regulate biological control practices, and those agencies seek peer review of the test results before they issue permits for field release of the control agent.

It is important that host testing lists be sensible, and minimal consistent with ensuring that there are no effects on non-target organisms. The longer a list the greater the time and cost involved, and the greater the threat that practitioners will cut corners to save time and funds.

Recommendation 5. **The reviewers found widespread concern over the current way in which host test lists are developed. The best way to formulate host test lists is likely to remain a contested subject. We recommend that appropriate taxonomists must be involved in the review process for each application.**

Release of approved control agents from quarantine

One further risk at release, after all permits have been issued, is that there may have been some contamination of the cultures in quarantine by organisms that have been undetected and are undesirable for the Australian environment. Maintenance of good hygiene and breeding of cultures by expert staff who can detect alien organisms can avoid this possibility. Quarantine protocols should specify that no host material is taken out of quarantine when the biological control agent is released. Exceptions to this standard procedure should be assessed as part of the review process before release permits are given.

The ruling that no organism can be released into Australia without being bred through one generation is an essential step in the biosecurity process and applies to all subsequent importations of agents that have been approved for release. Without this ruling, there would be a risk of contaminated material being released. Any variation to this procedure must be approved by Biosecurity Australia.

Recommendation 6. **Applications to release biological control agents from quarantine should specify exactly what material will be removed from quarantine. Applications should also state that the agents have been reared through at least one generation unless otherwise approved.**

Post-release assessment of target and non-target impacts

Agencies funding biological control should require and fund an assessment of the impact of the program they have funded. Unfortunately, whilst there is support for these studies, there is a reluctance to commit funds. In some respects, this is understandable as it may be 10 years or more before impacts are apparent. However, a small injection of funds will at least allow researchers to determine whether agents have established and are self sustaining. In recent years there have been several instances where agents have been approved for release on the basis that they cause very significant damage to the target plant (in the case of weeds) and insignificant damage to one or more closely related non-target plants. It is crucial that these predicted non-target effects are monitored. The safety of the science of biological

control depends on the researcher being able to accurately predict, under quarantine conditions, the hosts that will support feeding and breeding of the control agent and, post release, being able to verify these in the field.

Several researchers expressed concern to the review panel that lack of funds was prohibiting post release assessment, particularly of non-target effects.

Recommendation 7. **When biological control projects are funded, provision should be made for adequate post-release monitoring of both target and non-target impacts.**

Assessment of biological control applications and the issue of permits

On average, about 20 applications are processed per year. Permits are issued for the import of biological control agents into quarantine in Australia. The agents are then subjected to host specificity testing in quarantine, and the test results are submitted and evaluated as described below. If satisfactory and there are no objections from stakeholders, a letter of permission is issued which varies the conditions of the original permit to allow release from quarantine. The Department of Agriculture, Fisheries and Forestry (DAFF) and the Department of Environment and Heritage (DEH) are both involved at all stages of the process.

Within DAFF, Biosecurity Australia (BA) undertakes the processing and evaluation of applications, but the actual permit is issued by AQIS (the only agency that can take such action under the Quarantine Act). For the importation into quarantine, BA evaluates the request and then recommends that AQIS issue a permit, with or without any special conditions that may be applied. There is no outside consultation by BA at this stage of the process, since the material is only imported into quarantine. Generally a permit covers the importation of only one species, but it will be current for a period of 2 years and during that period multiple importations of the species may be made under the one permit.

A separate application is made by the biological control practitioner to DEH. If the species is not on Part 1 of the DEH live import list, then DEH must also issue a permit for importation for testing.

Practitioners must at some stage draw up a proposed host specificity test list for approval. This is usually submitted with the application for import approval. It may be done later, but there is then a risk that stakeholders may require additional species to be tested, causing delays in granting of release approval. BA circulates the list to its 21 “cooperators” (see below) for approval, and subject to their comments a list is then agreed with the biological control applicant. DEH does not have a separate process for approving this list, but is involved because it is one of the cooperators.

Host specificity testing is then conducted in quarantine. When it has been completed the results are submitted to both DAFF (BA) and DEH with a request for approval to release the agent from quarantine. Both agencies consult with external stakeholders before issuing their respective permissions.

Within DAFF, BA again manages the process of assessment. They have a panel of 21 "cooperators" who evaluate the host specificity testing reports and other biological information submitted. BA at the same time makes its own scrutiny of the application. The 21 cooperators are:

Biosecurity Australia (who initiate the consultation, but also appraise applications themselves)
Australian Quarantine & Inspection Service
Australian Government Department of the Environment and Heritage
ACT Environment, Planning and Legislation
NSW Agriculture
NSW National Parks and Wildlife Service
NT Department of Business, Industry & Resource Development
NT Parks and Wildlife Service
Queensland Department of Primary Industry
Queensland Department of Environment & Heritage
SA Department of Primary Industries
SA Department of the Environment & Heritage
Tasmanian Department of Primary Industries, Water & Environment
Tasmanian Parks and Wildlife Service
Victorian Department of Primary Industries
Agriculture Western Australia
Western Australian Department of Conservation & Land Management
CSIRO Entomology
CSIRO Plant Industry
Alan Fletcher Research Station (Qld Department of Natural Resources & Mines)
Keith Turnbull Research Institute (Department of Primary Industries, Victoria)

The cooperators are required to respond within 40 working days to say whether or not they approve the release application. Near the end of the 40 days BA follows up with agencies that have not responded to check whether they wish to comment. If an agency does not approve the application, they give reasons for objecting which are then forwarded to the applicant who can respond. An exchange of views may then ensue. If any one of the 21 cooperators still objects and the objection cannot be resolved, permission for release is refused. If no objections are received, AQIS issues a letter varying its original import permit to allow release from quarantine, on the advice of BA.

The Department of Environment and Heritage also receives the report on the results as required by its legislation. DEH posts the report, plus all related information, on its web site. It emails about 150 potentially interested stakeholders to advise that the application is on the web site, and notifies all relevant State and Territory Ministers, including DAFF. It allows 40 working days for comment. If no objection has been raised at the end of that period, the report is submitted to the Minister of the Environment for approval. If the Minister approves it, an instrument is signed and gazetted and tabled in both Houses of Parliament for 15 sitting days. DEH issues a letter of release after Ministerial approval has been granted.

As one of the 21 cooperators DEH also receives from BA a copy of the report on the results of the testing.

It seemed to us as reviewers of this process that there is some duplication in the role of the Department of Environment and Heritage. They are consulted in their role as one of BA's 21 cooperators, and they receive all applications in that capacity. However, they also receive the application in their own right under the EPBC Act. They can only make one assessment from their environmental point of view, and it would seem that no value is added to the process by making applicants submit separately to BA and DEH. As long as DEH remains on BA's list of cooperators (and there is no thought to change this), and as long as any one agency has the power to stop a release if it objects (which is the case at present, and again there are no plans to change it), DEH would have all the rights of scrutiny, consultation and veto that it currently has without having to receive its own separate applications and respond to them. We emphasise that in no way do we suggest through these remarks that DEH should not be an essential part of the assessment process – merely that it could achieve this fully through its existing role as a BA cooperator.

Recommendation 8. **We recommend that possible duplication between the application and evaluation processes of DAFF and DEH be examined, and that actions be taken to minimize it.**

In conducting this review it seemed to us that potentially one of the most important checks within a biological control operation is the system of reviewing applications for import and release of agents. However, such a system is only effective if sufficient expertise is available amongst the scrutineers of the applications to identify and correct any flaws or problems.

A number of respondents made the point that they sometimes find it difficult to locate experts on all the taxonomic groups or biological systems that may be involved in an application. Taxonomic resources are shrinking everywhere, and no department would encompass all the expertise that would be needed. If the cooperators charged with undertaking application assessments make the effort to seek expert opinions, there is no problem. In our questioning of several agencies we found that they do show great responsibility and make major efforts to obtain expert comment, so the system appears to be working well at the moment.

However, as work pressures increase and staff numbers are reduced everywhere, one can envisage a situation where cooperators without resident expertise might assume that another cooperator would take the responsibility for sound checking, and they might do nothing. If this happened among a number of the cooperators, the present good system of scrutiny would be compromised. We therefore urge BA to ensure that the cooperator system remains a robust and effective check on biological control applications.

Several agencies (BA, AQIS, Plant Health Australia) are compiling registers of taxonomic expertise in Australia (and elsewhere), and such lists could usefully be circulated to the cooperators to help them to locate expertise. Increasingly these days such experts are suffering increased workloads, and are obliged to charge for their services. We believe that getting access to expert opinion is so important for obtaining sound assessment of applications that the Commonwealth should consider

providing funding for access to expertise if necessary. Such funding could be sourced via the application fee system. Funding from a central Commonwealth source could also ensure that the same expert from the list was not consulted and paid several times by different agencies for the same advice.

As far as the composition of the panel of cooperators is concerned, we believe that as a minimum every state and territory should be consulted, and in each of these both the agriculture department and the environment department should be represented (where these are separate). The Australian Government Department of the Environment and Heritage must also be included. It is useful also to include some practitioners who can bring helpful expertise from the operations point of view (e.g. CSIRO, Alan Fletcher Research Station, Keith Turnbull Research Institute). This is almost exactly the composition of the cooperator panel at the moment, and we declare our view that this should remain the situation.

***Recommendation 9*. We believe that the system of cooperators is a vital part of the review process for biological control applications, both from the biosecurity and the environmental safety point of view. It is also a valuable forum for exchange of views between practitioners and those who are concerned about the safety of the processes. We recommend that the group of cooperators should include one representative of an agriculture department and one of an environmental protection agency in each state or territory, together with a representative of each group of practitioners at Alan Fletcher Research Station, Keith Turnbull Research Station and CSIRO.**

One further point made to us about the system of reviewing applications is that agencies might be able to do a more thorough job if a series of prompts was prepared to draw attention to the factors that need to be considered. Correctly prepared, this could be extremely helpful without preventing assessors from asking additional questions if they wish. Such a proforma set of questions is in fact used by the United States Department of Agriculture (USDA) in its own system of assessing applications, and it could be useful for BA to examine that proforma and modify it for Australian conditions. The USDA proforma is extremely detailed, and a simpler version for Australia might be just as effective without overloading the assessors of applications.

***Recommendation 10*. We recommend that a standard proforma accompany applications to release biological control agents when sent to reviewers. One suggested model is the USDA proforma (see Appendix 2).**

Other information on how to review applications to import and release biological control agents is available on a CD produced by the University of Queensland in 1998. Its aim was not only to assist those reviewing applications but also to show those writing applications what steps are involved in the review process. The CD is entitled “Reviewing Applications to Import and/or Release Biocontrol Agents into Australia”, and is available (at a cost) from the following web site: http://www.cbit.uq.edu.au/software/weedbiocontrol/default.htm

Overall management of biological control import and approval processes

In the course of this review we came to the strong conclusion that one major key to safe operation of biological control importations and releases in Australia is a technically competent and well resourced central unit that maintains overall control of all the processes. Currently this unit is located in Biosecurity Australia.

The assessment and approval processes are not simply mechanical operations that can be applied by anyone with basic clerical skills. Safe operation requires sound understanding of the biological factors involved and the relevant biosecurity parameters. Currently the processes are managed by Dr Ting-kui Qin, who is a graduate biologist with a broad range of biological skills and experience. We believe that this contributes greatly to the present safe record of biological control in Australia, and we consider that it is very important that the operations continue to be managed by someone with this level of qualification and experience.

One issue mentioned to us by a number of people, both biocontrol practitioners and cooperators involved in assessment of applications, was that they would appreciate more feedback on the progress of import and release applications. Those who submit applications would be interested to know how many cooperators responded and what comments were made, and the cooperators likewise would be interested to know how many others commented, and whether they shared their own opinions or not. It is not essential that this happen for safe operation of the processes, but human nature being what it is, people who are currently working well to keep the processes safe thought they would feel even more motivated to do well if they had this feedback.

One forum in which those involved in these processes can get first-hand feedback is the annual meeting of cooperators, which also includes some biological control practitioners. A number of respondents to the review felt that at present this meeting does not offer enough incentive for people to attend, and they felt that more interaction between all the parties could help towards better overall safety, and understanding of the points of view of others. We recommend that BA look at the current format of the annual cooperator meetings, to see whether attendance levels can be increased.

Concomitant with the above, it is important that adequate resources be made available by the Commonwealth for these operations to be conducted soundly. We have made reference above to the possible need for support for experts to assist with appraisal of applications, and some support may be needed to increase the level of attendance at the annual cooperator meetings.

Recommendation 11. **We recommend that the management of import and release approval processes continues to be by someone with a high level of biological qualifications and a sound understanding of all the biological and biosecurity factors involved, and that adequate resources be made available by the Commonwealth for the efficient and safe operation of these processes. We further recommend that ways be sought to give all involved in the processes better feedback on the progress and outcomes of import and release applications.**

6. Concluding remarks: Biosecurity versus ease of biological control operations – getting the balance

In conducting this review we have tried to strike a balance – ensuring that biological control operations in Australia are carried out with maximum safety combined with the least number of regulatory impediments on the practitioners of biological control. It was clear to us that biological control is widely favoured by Australian agencies as a means of controlling exotic pests, and the last thing we would wish to see is the practice disappearing because it is simply too difficult to meet all the regulatory requirements. Regulators should bear in mind the need to impose the minimum of impediments consistent with safety. Nevertheless, there are ways in which risks could develop if adequate safeguards are not in place. Our recommendations aim to maintain an acceptable level of biosecurity with least change to the existing system.

7. Acknowledgments

We are grateful to the many people who met with the Review Team to discuss their views on the operation and safety of biological control in Australia, in some cases spending considerable amounts of their valuable time to give us a good understanding of the issues and their concerns. Many others also sent detailed responses to the letter sent by DAFF to canvass views on the subject.

We would also like to thank the staff of the Office of the Chief Plant Protection Officer for varied assistance, and others in DAFF. In particular we thank Dianne Shuttleworth for much administrative assistance and provision of background information, Glynn Maynard for many useful insights into the development of the current procedures and other useful background information, and Ting-kui Qin for valuable discussions and information on the operation of a process that he knows intimately.

8. List of Acronyms

AQIS	Australian Quarantine and Inspection Service
BA	Biosecurity Australia
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Australian Government Department of Agriculture, Fisheries and Forestry
DEH	Australian Government Department of the Environment and Heritage
EPBC Act	Environment Protection and Biodiversity Conservation Act
ISPM	International Standard for Phytosanitary Measures
OCPPO	Office of the Chief Plant Protection Officer (DAFF)
USDA	United States Department of Agriculture

Appendices

Appendix 1: List of people contacted by the review

State	Organisation	People contacted		Response
QLD	CSIRO Entomology - Long Pocket Laboratories	Tim Heard	letter/meeting	Met
		Paul De Barro	e-mail	Yes
		Marc Coombs	meeting	Met
		Matthew Purcell	e-mail	Yes
		Mic Julien	meeting	Met
		John Goolsby - USDA	meeting	Met
	Alan Fletcher Research Station	Bill Palmer	letter/meeting	Met
		Dhileepan Kunjithepatham	meeting	Met
		Michael Day	meeting	Met
		Noel Wakerly	meeting	Met
	Department of Natural Resources & Mines	Jim Thompson	meeting	Met
		Brian Vanderzee	meeting	Met
		Bruce Wilson	meeting	Met
		Peter Mackay	meeting	Met
		Chris Robson	meeting	Met
	CRC for Australian Weed Management	Rachel McFadyen	letter/meeting	Met
	Department of Primary Industries & Fisheries	Brian Cantrell	letter/meeting	Met
	Environmental Protection Agency	John Neldner	letter/meeting	Met
		Rebecca Williams	meeting	Met
		Mike Harris	meeting	Met
		Gordon Guymer	meeting	Met
ACT	CSIRO Entomology	Joanne Daly	Letter	
		John Curran	Letter	
		Andy Walker	meeting	Met
		Louise Morin	meeting	Met
		Jim Cullen	e-mail	
	CSIRO Plant Industry	Peter Thrall	letter/e-mail	Yes
	Biosecurity Australia/Plant Biosecurity	Ting-kui Qin	letter/meeting	Met
	AQIS/DAFF	Anthony Wicks	meeting	Met
		Denis Snowdon	meeting	Met
		Margaret Allan	letter	

	Department of the Environment & Heritage	Jane Campbell	letter/meeting	Met
		Charles Brister	meeting	Met
		Tammy Stefani	meeting	Met
	Plant Health Australia	Rod Turner	letter	
	Plant Health Committee	Fiona Macbeth	meeting	Met
	Australian Weeds Committee	Paul Pheloung	meeting	Met
	WWF	L Kennedy	e-mail	
WA	CSIRO Entomology	John Scott	letter/meeting	Met
	Department of Conservation & Land Management	Ken Atkins	letter/e-mail	Yes
		Peter Mawson	letter/e-mail	Yes
	Agriculture WA	Nic Monzu	letter/e-mail	Yes
VIC	DPI/Keith Turnbull Research Institute	Raelene Kwong	meeting	Yes
		Ian Pascoe	meeting	Yes
		El Bruzzese	meeting	Yes
		Robin Adair	meeting/e-mail	Yes
		David McLaren	meeting	Yes
		Pat Sharkey	letter/meeting	Yes
	Department of Sustainability & Environment	Joanne Green (nee Webber)	e-mail	Yes
		Ross Williamson	e-mail	
	Monash University	Dennis O'Dowd	e-mail	
	Consultant	Peter Merriman	e-mail	Yes
	Royal Botanic Gardens	Neville Walsh	e-mail	Yes
	Robinvale/Manangatang Landcare Group	Jamie Pook	phone	Yes
TAS	Department of Primary Industries, Water and Environment	Danny Reardon	letter	
		Margaret Williams	e-mail	Yes
		Greg Hocking	e-mail	
		John Ireson	e-mail	Yes
		Alex Schapp	e-mail	
		Stephen Harris	e-mail	Yes
		Andrew Bishop	e-mail	
	Australian Weeds Committee	John Thorpe	letter	

SA	SA Research and Development Institute	Dennis Hopkins	letter/e-mail	Yes
	Department of Environment & Heritage	Peter Alexander	e-mail	
NSW	Agriculture NSW	John Hosking	letter/e-mail	Yes
	Environment & Conservation	Lisa Corbyn	letter	
NT	Department of Business, Industry & Resource Development	Brian Thistleton	letter/e-mail	Yes
	Department of Infrastructure, Planning & Environment	Blair Grace	letter	Yes
		Rob Taylor	e-mail	Yes

Appendix 2: Sample Reviewer's Comment Sheet as used by USDA

Reviewer's Comment Sheet for Petitions for the Release of Biological Control Agents of Weeds Technical Advisory Group (TAG)

Section 1: To be completed by the TAGExecutive Secretary	**Return Formto:**
Designation Number: Date Request Received: Date Sent to Reviewers: Review Due Date: Biological Control Agent: Target Weed: Petitioner's Name and Affiliation:	Polly Lehtonen, Botanist USDA,APHIS,PPQ 4700 River Road, Unit 133 Riverdale, MD 20737-1236

Section 2 To be completed by the TAGReviewers. (If needed, use additional sheets.)			
A. Accuracy, Completeness, Comprehensiveness	Acceptable	Unacceptable*	Not Evaluated
• Target Weed Information Comments:	—	—	—
• Biological Control Agent Information Comments:	—	—	—
• Experimental Methodology and Analysis Comments:	—	—	—
• Test Plant Ust Comments:	—	—	—
• Results and Discussion Comments:	—	—	—
• Potential Environment Impacts Comments:	—	—	—
• Petitioner's Conclusion Comments:	—	—	—

B. Thoroughness of Addressing Agency Concerns Comments:	**Concerns Met**	**Concerns not met**	**Not Evaluated**
	—	—	—
	Acceptable	**Not Acceptable**	**Not Evaluated**
	—	—	—
C. Recommendation of Your Agency **Comments/List of additional specialists:**	**Recommended without Reservations**	**Recommended with Reservations***	**Not* Recomended**
	***requires comments**		