

INTERSTATE PLANT HEALTH REGULATION WORKING GROUP

**AUDIT OF THE RED IMPORTED FIRE ANT
MOVEMENT CONTROLS**

15 – 17 JULY 2003

AUDIT REPORT

1. Audit Scope

At the Interstate Plant Health Regulation Working Group (IPHRWG) Meeting of March 2003 it was agreed the Movement Controls and associated working operations conducted by the Fire Ant Control Centre (FACC) under the direction of the Queensland Department of Primary Industries (QDPI) would be subject to audit so that member States could have confidence in the certification of transferring nursery stock from the infested areas for interstate trade.

In this regard the audit team were to;

- a) review the current implementation of the Fire Ant movement controls by the Risk Management and Security Section of FACC and
- b) Identify areas and make recommendations of possible improvement in implementation of movement controls.

2. Auditors and Dates of Audit

The auditors acting for and on behalf of the IPHRWG were;

Lead Auditor	Brian Tucker	- AQIS - Horticulture Export Program
Auditors	John van Schagen	- Department of Agriculture Western Australia – WA Quarantine and Inspection Service
	Peter Regan	- NSW Agriculture – Health Regulation Program

The audit was conducted from the FACC administration office in Oxley on 15 – 17 July 2003.

3. Entry Meeting

Following and introduction and familiarisation meeting giving the auditors some background information on the progress and current status of the Fire Ant eradication program, an Entry Meeting was held at the FACC at 9.35 am, 15 July 2003. In attendance were the following personnel;

The IPHRWG audit team consisting of - Brian Tucker, John van Schagen and Peter Regan,

The QDPI and FACC management personnel consisting of – Keith McCubbin, Jason Haffenden, Frank Fox, Rob Ritcher, Randall Cummings, Cameron Tree, Ian Douglas, Cas Vanderwoude and Craig Jennings.

Keith McCubbin requested clarification of the Audit Scope in relation to monitoring and eradication systems as it was his opinion that the audit was meant to confine itself to the Movement Control and Security systems associated with the Nursery Stock industry. Brian Tucker explained that whilst this was the main criteria of the audit, should it become necessary to clarify issues regarding movement control that impacted on other FACC operations, that the audit team would need to properly investigate such issues to justify any final audit report and recommendations.

4. General Information

The audit team measured the following elements of the Risk Management and Security section of the FACC;

- | | |
|----------------------------------|--------------------------------------|
| . Management Responsibility | . Organisation Structure |
| . Quality Systems | . Training |
| . Document and Data Control | . Control of Quality Records |
| . Reporting Systems | . Process Control |
| . Inspection and Auditing Duties | . Corrective and Preventative Action |

The following businesses were visited during the audit;

- . Waste water treatment plant (Qld Govt. Department) – Discovery of a fire ant nest. Staff at the plant (mainly the project manager) were interviewed, questions mainly relating to observations made on site, eg movement of soil in relation to building of new settlement ponds, potted plants seen on site, a bobcat was seen shifting sand etc. Staff treating the nest had job-sheets that they completed and returned to FACC for inclusion on the database.
- . Sunstate Nursery – Witnessing an ARMP audit. Mainly producing Ficus plants. Had RIFA nest 15 months previously (April 2002) but nothing seen since. ARMP in place since May 2002 and this was the first audit. FACC inspector visits regularly to supervise spray treatments. No non-conformance was found during the audit and the owner was well aware of his responsibilities and appeared to be a conscientious person with relation to implementing protocols. The audit was conducted well in a systematic manner, however questions were mainly confined to those given on the audit checklist.
- . Random Surveillance visit at a new housing development in Stretton. Sub-contractor was seen excavating a trench on a new building block. Inspector checked with FACC head office as to whether a site inspection had been conducted prior to work commencing. This was negative. Inspector approached the operator who appeared to be rather unco-operative and informed him of the requirements and provided printed information. The builder then appeared and was also informed of the requirements. Apparently the builder was operating under an ARMP but failed to contact FACC to arrange a site inspection. The builder was given a verbal warning and the incident would be recorded on his records in the database for future referral as a non-conformance at audit.

- . National Landfill – Movement Certificates were collected by persons at the gate office of this waste/soil disposal site. These were collected by the FACC inspector for verification against site inspection records (so she stated). There appears to be good co-operation between the Landfill operator and FACC staff. Names and contact details are collected from persons without Movement Certificates for follow up by FACC staff.
- . Rivercity Hire – An audit of this earth moving business that has a ARMP was observed. The business schedules work for approx 30 truck and bob-cat drivers. FACC officer had been in regular contact with the business to assist with the implementation of the Plan. This business displayed a high level of understanding of the ARMP requirements and a willingness to implement those requirements. One major non-conformance was found at audit involving the businesses failure to implement movement certificates in accordance with the ARMP requirements and this is subject of further consideration at Major Non-conformance No2. attached.

5. Exit Meeting

An Exit Meeting was conducted at 12.20pm on 17 July 2003 with the following persons in attendance;

The IPHRWG audit team of Brian Tucker, John van Schagen and Peter Regan

FACC management team of Keith McCubbin, Jason Haffenden, Rob Ritcher, Randall Cummings, Frank Fox and Cas Vanderwoude.

The audit team thanked both management and staff who were involved in the audit for their co-operation, enthusiasm and professionalism. The auditors whilst finding some non-conformances were generally impressed with the operational systems that are in place and with the management principles that are being applied.

The auditors have found 3 major non-conformances, one minor non-conformance and two audit observations. These findings are at Attachment 1. Whilst the exit meeting discussed in full and accepted the findings it was agreed that FACC formally acknowledge these findings (and where it can be done, place in writing the corrective actions that are intended to be implemented) before the final report is forwarded to IPHRWG.

The Exit meeting concluded at 1.00pm.

Signed by;

Brian Tucker
Lead Auditor

John van Schagen
Auditor

Peter Regan
Auditor

INTERSTATE PLANT HEALTH REGULATION WORKING GROUP

AUDIT OF THE RED IMPORTED FIRE ANT
RISK MANAGEMENT AND SECURITY SYSTEMS

15 – 17 JULY 2003

AUDIT – NON-CONFORMANCES

Major Non-conformance 1**Businesses with Approved Risk Management Procedures will be audited annually.**

This management criterion has not been completed. Auditors were advised that there are now 2349 businesses with ARMP's and with current resources it is impossible to complete all audits. Auditors were further advised that it is the intention of the Risk Management and Security section that they will assess all ARMP's for "level of risk" and ensure that all high risk businesses will be audited in the next 12 months. It has been estimated that there are more than 600 "low risk" businesses that should be culled from the ARMP regimes.

It is intended that a new management regime will be implemented to address each of the high risk business so that audits of high risk businesses are scheduled in a defined manner and can be properly assessed at the end of each reporting period.

Auditee Response

The Fire Ant Control Centre accepts this finding. The Risk Management & Security section has implemented processes that will meet the audit requirement for the 2003-2004 year. The management of the audit process is under further refinement with the planned review point of December 2003 being brought forward to ensure that all businesses on an ARMP will have their audit requirement met.

Further to advice from the audit team, it was recognised that many of the audits that were completed prior to the establishment of the current format of ARMPs were not recorded.

Recording of spot field monitoring of compliance has not been recorded in a way that is reportable. While it is impossible to retrospectively address this situation, efforts are being made to ensure that future efforts are recorded.

Major Non-conformance 2**At a FACC Audit of an ARMP involving an earth moving business a non-conformance was detected (no Movement Certificates being issued) but no non-conformity was recorded.**

Two major concerns were noted here. Firstly that Movement Certificates are not being issued which is a condition under the requirements of an ARMP and secondly that at audit when evidence was provided that the requirements were not being met, the auditor

failed to make a non-conformance against that business. This means on the businesses records there is no evidence of a breach of the ARMP for subsequent auditors to follow up.

During discussion on the first point, FACC management acknowledged that they were having all sorts of difficulty in making businesses comply with Movement Certificates. Even businesses that do write out Movement Certificates have difficulties with drivers/contractors taking them out of the office or if they do they then throw them on the ground before getting into the truck/transport. It was agreed that a penalty system is probably not the way to approach such an issue but how to implement a pro-active system has eluded management to this time.

Every business under an ARMP will have their own operating system. For example, it was noted that movement certificates could be issued by this particular business by fax when assigning work to individual drivers. However when work is assigned over the telephone, the driver would be responsible for issuing of the movement certificate. Auditors also noted that the Site Inspection approval document is accepted in the workplace as evidence that movement has been approved. Subsequently, the issuing of a movement certificate is perceived by some to be a duplication of that requirement.

As the major concern here is the movement of soil off site without a site approval. There may be a solution in combining Site Approval and Movement Certification requirements.

The second issue of an auditor ignoring evidence (assumed because he did not have a suggestion that would overcome the problem) cannot be condoned regardless of the situation. Whilst auditors are aware that Management know of a considerable problem with Movement Certificates, had the non-conformance been concerning another matter the fact that management may not have become aware of an issue is of paramount importance to the successful management of the overall integrity of the systems that are in place.

Auditee Response

The Inspector conducting the audit where the non-conformance was detected and not recorded has received further explanation of audit requirements and has since raised a non-conformance to rectify the situation.

Further as stated in the first response the management of the audit process is under review, the allocation of dedicated staff to this task will assist in the provision of consistent audit of businesses.

Major Non-conformance 3

There is no written Management System summarising the Risk Management and Security strategies from the FACC Policy Documents.

The audit team were able to sight and investigate two Standard Operating Procedures that have been written covering the operational requirements for staff whilst performing their various duties, however there is no document that shows how management assess, review, and monitor field performance. Additionally, without a summary document,

audits are more time consuming because there is no document that tells the auditor what is going on and who is responsible for it.

The audit team were comfortable that management tasks were being undertaken with a responsible attitude however, effective measurement was haphazard because there was no single document that covered this issue.

The audit team recommends (at this late stage of the management scheme) that a Hazard Analysis Critical Control Point Audit Table be undertaken as a summary sheet to explain all aspects of the management control systems. This is likely to be a two or three page document rather than writing an elaborate management system detailing all aspects of how it is done, by who and when.

The Risk Management and Security activities cover some 11 major tasks (Implementation of Movement Controls, Approved Risk Management Plans, Site Inspections, Auditing, IPQ Inspection and Supervision etc.). The audit team assumes that in each of these allocated tasks there is likely to be a number of Control Points and Critical Control Points. The audit team recommend that as a minimum for each activity that at each identified Critical Control Point there should be;

- . a nominated officer who is responsible at that point,
- . a measurement scheme and how often measurement is required to be notated,
- . a record that is made of each measurement and where it is filed
- . a reference to a Standard Operating Procedure for staff guidance where such a document exists.

Auditee Response

Many of the aspect raised are already covered within the overarching National Fire Ant Eradication Plan. However the Fire Ant Control Centre is investigating providers of HACCP training with the view, if deemed appropriate, of implement these procedures in Risk Management and Security activities.

Minor Non-conformance 1

The audit team observed a investigation of a new infested site at an Ipswich Waste Water facility. The investigating officer conducted the interview with authority and was able to determine that the new infestation was not likely to have occurred due to movement of soil or infested material coming onto the site.

The audit team were concerned that in the instance above, had there been a deliberate or accidental breach of the protocol, did the investigating officer have a checklist to ensure all required questions, documents, records etc. had been completed before departing the infested site.

While auditors acknowledge that the incident of new infestations resulting from soil movement is very low, the audit team believed that at this stage of the eradication program, there should be an SOP that includes the procedure for the investigation of an offence.

This issue is also raised in the previous 'Major Non-conformance 3' and would flow from the identification of critical control points that include a breach of legislation.

Auditee Response

The Fire Ant Control Centre does not agree that the incident described here constitutes a Non Conformance.

Risk Assessments are carried out on every infested premise, and as part of this assessment a series of points are covered including the potential for High Risk movements and possible causes of infestation.

The Inspector responsible for carrying out the Risk Assessment makes suggestions for further action and discusses these with either of the Senior Inspectors who approve the action required.

Should the slightest suggestion of a possible breach of legislation be detected this is fully investigated. RM&S Inspectors are in the process of completing investigative technique training.

Should any aspects of the investigation suggest a breach has occurred then further formal questioning can be conducted if required.

Observation 1.

The present formatting of ARMP's contain records that use "tick sheets".

The audit team recognises that simplified documents assist businesses to complete useful records and that to make them more complex could result in a negative response from industry however, the auditors recommend that initials and dates to indicate an activity has been completed rather than a tick or a dash style document. Providing a date will also allow for verification checks against documentation of associated activities, should this be necessary.

Auditee Response

The Fire Ant Control Centre agrees with this observation and has taken steps to implement this into Approved Risk Management Plans.

Observation 2.

The following observation made by the audit team is a definite breach of the Movement Control requirements however it may not necessarily be considered a serious one but more so highlights the need for uniformity for all participants who are conducting business within the RIFA declared restricted areas.

Auditors observed and were advised that there is an inconsistency between wholesale and retail nurseries in relation to major retail outlets reluctance to adopt all the requirements of an ARMP in particular to include certification with their produce as meeting FACC requirements at the point of sale.

The audit team recommends that for uniformity, consistency and reaction from consumers in the restricted areas that all retail nurseries must certify every sale of plants and display the appropriate FACC point of sale signs, thus verifying that the produce meets the conditions and requirements of the FACC Movement Controls for a ARMP system.

Auditee Response

The Fire Ant Control Centre accepts and strongly agrees with this observation.

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**OPERATIONS REVIEW OF THE RED IMPORTED FIRE ANT
ERADICATION PROGRAM**

October 2003

**Report for:
The Red Imported Fire Ant – National Consultative Committee**

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CONTENTS	PAGE
The Operations Review Panel	3
The Purpose of the Operational Review	4
Terms of Reference	4
Executive Summary	5
Background	9
Method	10
Preliminary Remarks	11
Recommendations	
The Fire Ant Control Centre Based Program	12
The National Surveillance Program	21

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THE PURPOSE OF THE OPERATIONAL REVIEW

The Natural Resources Management Ministerial Council (NRMMC), which is the decision making body for funding the National Red Imported Fire Ant Eradication Program (RIFA Program) has set the following milestones for the program –

NRMMC Milestones to June 2004

1. Treatment provides an acceptable level of control of RIFA to June 2004
2. No significant RIFA infestations found in surveys outside the known infested areas in Queensland or elsewhere in Australia by June 2004
3. Favourable report from independent operational and financial audits of all RIFA program elements, including interstate to June 2004

In accordance with the NRMMC Milestone 3, at its meeting on 25 July 2003, the National Monitoring Group (NMG) agreed to hold a review of the Fire Ant Control Centre (FACC) operations for consideration by the end of the calendar year.

The purpose of this review is to report on the RIFA Program against nominated Terms of Reference (ToR) from the particular perspective of operational effectiveness and efficiency of the eradication effort and to make recommendations on perceived areas for improvement

This will be achieved by:

- A detailed review of core operational areas;
- Review of inter-relationships with other key functional areas;
- Evaluation of operational management systems;
- Recommendations to address any deficiencies and enhance performance;
- This review will complement separate scientific and financial reviews of the program.

TERMS OF REFERENCE

The terms of reference are: -

To review the effectiveness and efficiency of the operations of the FACC with respect to -

1. Appropriateness of the organisational structure to achieve the overall eradication objective;
2. Work planning on a seasonal and daily basis;
3. Deployment of all resources including staff in the field;
4. Quality assurance and other control measures;
5. Effectiveness of communication and coordination activities – with both internal and external stakeholders, including the public;
6. Appropriateness of information system use;
7. Management of staff resources – including the approach to recruitment and the appropriateness and effectiveness of training.

The team will also consider and make recommendations on the approach to operations during the post-control/surveillance phase of the program in 2004/05 and, in particular, on an approach to scale up control activities if needed during the surveillance phase.

EXECUTIVE SUMMARY

The Operations Review Panel (ORP) was favourably impressed with the overall infrastructure and achievements of the FACC – particularly in such a challenging operating environment. There appeared to be a strong and positive culture of achievement that embraced the principles of continuous improvement fostered by a clear vision and common sense of purpose.

It is not possible, at this time, to determine whether the ultimate program aim of eradication can be achieved (refer to the Scientific Review). Nor is it within the scope of this review to recommend a particular strategic shift of the program's scientific focus. However, it is worth recalling international experience and the failure to implement or persist with early intervention to eradicate this pest and the associated long-term social, environmental and economic costs. Economic evaluation of the welfare of the program will assist in determining subsequent recommendations for future program direction.

It is difficult to forecast the nature, extent or probability of future 'outlier' discoveries and their impact on the program. Consideration should be given to broad contingency planning for a reasonable array of credible scenarios to decrease any subsequent lag phase in planning and implementation.

Given the considerable investment of resources and intelligence associated with this program any responsible termination phase should include a mechanism for the incorporation of such valuable information into future emergency planning systems that can be readily available for guidance in counterpart or subsequent programs.

The program is facing a resource shortfall realised by the discovery of additional infestation areas beyond established boundaries. In order to remain within budget allocations, a number of options have been developed to address key priorities for eradication. Lack of additional funding support is likely to produce sub-optimal results in order to satisfy financial constraints. This area is largely beyond the scope of this review, however, the impact that delayed funding decision-making has on operational planning is significant.

The program appears to be on track with most targets and milestones accomplished on time. Not all targets could be achieved and were attributed to a combination of factors inside and outside the influence of the FACC (e.g. internal competition for shared resources, database issues involving identification of additional areas and subsequent increases to infestation boundaries, physical accessibility to some areas). The scarcity of performance measures against outcomes prevents a more objective evaluation of operational efficiency.

The ORP was conscious of the disruption program reviews can cause and would suggest that any future assessments involve a single, more comprehensive, combined evaluation by a multi-disciplinary panel rather than multiple, separate financial, scientific and operational reviews. This approach could also deliver synergistic benefits through these linkages.

The timing, relevance and impact of a review must also be carefully considered in the context of the expected duration (or lifecycle) of a program. The nature of this program has essentially been one of emergency management. In the early and peak phases of the program, reviews would have been an intrusion and posed an operational impediment. At present, although operational activity is still high, the program has reached a more stable phase and is beginning to contemplate the next stages of its forecast lifecycle. The ORP also felt that a

more comprehensive review was constrained by the short preparation time and limited timeframe available.

Implementation of recommendations from this review will need to consider resource implications as well as the any net benefits likely to be realised as the program approaches the 'twilight' and downsizing phase of its forecast lifecycle. It should be stressed that this evaluation was a review process and not intended as a detailed audit of FACC operations.

Sound operational systems are in place and implemented appropriately. While not all systems may be optimal, they are effective and with further refinements are likely to realise additional functionality and efficiencies. This is supported by a culture of continual improvement plus the positive attitude, dedication and integrity evident in the personnel interviewed.

The ORP identified two impediments to an effective response that require a response at the national level. The impediments relate to being able to use the best treatment substances and the issue of knowledge retention. While they do not currently affect the program they do command a priority for attention at the technical level in the national decision-making process and are discussed in recommendations 5, 6, and 14. As no group seems to be responsible for their progression they may require championing by the National Consultative Committee.

The National Surveillance Plan that is coordinated from Canberra was reviewed separately and the ORP findings reported as recommendations 21 –26.

In reviewing program operations, the ORP have formulated the following recommendations:

THE FIRE ANT CONTROL CENTRE BASED PROGRAM

Recommendation 1: The ORP endorses the strategic approach and organisation of the program, and recommends that the operating environment continue as it is currently established.

Recommendation 2: Organisational structure and management functions be periodically evaluated and modified to accurately target and reflect the needs and changing phases of the program and its operating environment.

Recommendation 3: Develop and maintain a formal risk analysis to identify areas of potential vulnerability and establish priorities for the preparation of appropriate countermeasures. Appropriate training for such credible emergency situations should also be conducted.

Recommendation 4: Consideration needs to be given to broad contingency planning as a means of advance preparation in the event of credible scenarios that could result in significant program impact.

Recommendation 5: Nationally endorse the priority of programs to provide for progression of decision-making by funding bodies and technical and advisory groups to allow for timely operational planning.

Recommendation 6: Establish a sustainable mechanism within APVMA, to facilitate rapid access to control agents for nominated uses through a system that prioritises applications for use and accommodates the urgent, emergency nature of requests.

Recommendation 7: Ensure adequate resources to achieve eradication targets are maintained at the national level.

Recommendation 8: The RIFA program continues to invest in further research into alternative detection methods for enhanced confidence in identifying infestations and potential efficiency gains.

- Recommendation 9:** QDPI expedite the finalisation of ICA arrangements for high-risk material movements so that FACC can divest responsibility for interstate certification/acceptance in favour of self-certification.
- Recommendation 10:** Develop performance measures throughout the organisation to offer added dimensions to milestone targets and provide a measure of efficiency and net benefit to funding stakeholders. Measures should provide cross-sections at given points in time (e.g. at milestone deadlines) as 'snapshots' of performance plus longitudinal measures to indicate changes in performance over time. Measures from functional areas should feed into measures of overall program performance. These measures include continual monitoring and analysis of cost drivers to identify areas that can be targeted for ongoing efficiency improvement.
- Recommendation 11:** The quality assurance systems in place continue to be developed with the rapid reporting of results to field staff being a priority.
- Recommendation 12:** Implement a reliable internal communications strategy to ensure consistent messages, clear lines of authority to minimise risk of miscommunication and the associated confusion of management requirements.
- Recommendation 13:** Rationalise committee and business meetings for maximum return and minimum disruption to core business.
- Recommendation 14:** Provide, at the national level, for survival of corporate knowledge and associated systems for future use in other emergency management programs.
- Recommendation 15:** Ensure that recruitment and personnel management processes permit adequate autonomy and discretion by FACC in the application of human resource processes.
- Recommendation 16:** Provide readily available professional assistance to line management for timely resolution of industrial issues that have the potential to threaten disruption to operational effectiveness.
- Recommendation 17:** Conduct training needs analyses to develop appropriate competency standards and delivery mechanisms to address training requirements in a structured manner.
- Recommendation 18:** Implement mechanisms to manage vulnerability of personnel and especially key personnel to work-related fatigue and/or stress.
- Recommendation 19:** Identify and adopt measures to preserve critical knowledge held by key individuals to minimise vulnerability to loss through staff turnover.
- Recommendation 20:** National resources support an integrated approach in the final phases of the program involving both the community and program surveyors.

THE NATIONAL SURVEILLANCE PROGRAM

- Recommendation 21:** Maintain a level of input in each jurisdiction that effectively accommodates the credible risks each jurisdiction will face.
- Recommendation 22:** Separate the horizons of the National Surveillance Plan from the Queensland eradication program and adopt a risk-based approach to planning.
- Recommendation 23:** That Queensland maintain a high level of fire ant surveillance, outside the greater Brisbane area, in accordance with the protocols agreed to under the National Surveillance Program.
- Recommendation 24:** The Chair of the Steering Committee of the National Surveillance Program reviews the legislative ability of each jurisdiction to respond to RIFA infestations.
- Recommendation 25:** Maintain a quality assurance system for field operators in the National Surveillance Program.

Recommendation 26: Develop performance measures for state programs to offer added dimensions to milestone targets and provide a measure of efficiency and net benefit to all funding stakeholders.

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BACKGROUND

In February 2001, two incursions of the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae), were discovered in Brisbane, Queensland, Australia: One near the mouth of the Brisbane River at the main cargo handling point of the Port of Brisbane (Fisherman's Island) and a second in Brisbane's south western suburbs. Subsequent surveillance revealed well-established populations spanning several thousand hectares across the two sites. A scoping phase (February – June 2001) determined that a treatment area of 27,807 ha and an additional "structured surveillance" area or "buffer zone" (2 km radius around treatment areas) would be required to attempt eradication of these infestations.

The National Fire Ant Eradication Plan, developed for the Agricultural Resource Management Council of Australia and New Zealand (ARMCANZ), was funded by a cost sharing arrangement with the Commonwealth, states and territories for \$A123.4M over 5 years.

The Fire Ant Control Centre (FACC) was established by the Queensland Department of Primary Industries (DPI) in April 2001. Treatment commenced in March 2001 on Fisherman's Island and September 2001 in the remaining treatment area. By June 2002, active and passive surveillance efforts had detected additional "outlier" infestations, increasing the program area from 27,807 to 39,009 ha (38.2%). In May 2002, the Natural Resources Management Ministerial Council (NRMMC, formerly ARMCANZ), agreed in principle to an increased budget for the program from \$123.4M to \$144.9M (17.4%) for the 5-year effort. Additional identifications of outliers have now increased the total treatment area to 50,959 ha. However, alternative treatment options that will enable the program to service this greater area, within the existing budget, are under consideration.

This independent assessment was conducted at the request of the National Monitoring Group (NMG) in October 2003.

METHOD

During the Review, 13-16 October 2003, the Operations review panel (ORP) reviewed relevant documents, held site inspections, individual discussions with managers of core operational functions, discussions with managers of key support functional areas and a group discussion with a representative cross section of experienced staff from surveillance and treatment coordination areas.

The Review focussed on the effectiveness and efficiency of core operational functions and their interaction with associated functional support areas within the organisation. The ORP also considered the approach to operations during the post-control/surveillance phase of the program [2004/2005] – with particular reference to an approach to scale-up control activities if needed during the surveillance.

The ORP interviewed Dr Ian Naumann, coordinator of the RIFA programs of the State and Territories, by phone link on 5 November 2003. The ORP findings are reported in the separate section from recommendations 21-26. For clarity, these findings are reported separately in the body of the text.

The ORP adopted a method of non-directive interviewing using a background of credible scenarios in its approach to discovery.

Reference Documents

Documents provided, included:

- Scientific Review of the Red Imported Fire Ant Eradication Program: Report to the Red Imported Fire Ant – National Consultative Committee, October 2002
- National Red Imported Fire Ant (*Solenopsis invicta*) Eradication Plan, October 2003
- Fire Ant Eradication Program Progress Report, June 2001 – September 2003.
- Summary: RIFA Eradication Strategy – Queensland, June 2001.
- Plant Protection Regulation 2002 – Queensland, 1 September 2002.
- Queensland Government – Department of Primary Industries, Fire Ant website (<http://www.dpi.qld.gov.au/fireants/>)
- Progress Report July 03 – September 03 -Slide presentation – NMG July 03.ppt.

During the Review, 13 – 16 October, the Operations Review Panel (ORP) held site inspections, individual discussions with managers of core operational functions, discussions with managers of key support functional areas and a group discussion with a representative cross-section of experienced staff from surveillance and treatment coordination areas.

FACC personnel interviewed:

- Keith McCubbin (Director);
- Ian Douglas (Operations Manager);
- Pat Killoran (Administration & Logistics / Business Manager);
- Jason Reberger (Treatment Manager);
- Cara McNicol (Surveillance Manager);
- Jason Haffenden (Risk Management & Security Manager);
- Stephen Gork (Mapping & Information Systems Manager);
- Cas Vanderwoude (Principle Scientist);
- Craig Jennings (Quality Assurance & Policy);
- Michelle Milzewski (Community Engagement Manager);

- Peter Hayes (PR & Training);
- Team Co-ordinators
 - Ross Dorward (Surveillance);
 - Glen Stewart (North side Co-ordinator, Treatment & Surveillance);
 - Tania Hetherington (Treatment);
 - Tonia Jackson-Lamb (Aerial Treatment);
 - Mark Stevenson (Treatment – ATVs);
 - Ashley Pickwick (Treatment)
 - Barry Cooper (Surveillance);

Other RIFA Program people interviewed

- Dr Ian Naumann, Principal Research Scientist, Department of Agriculture, Forestry and Fisheries, Canberra

A verbal summary of preliminary findings was presented to Keith McCubbin (Director, FACC) at the end of the on site review period.

PRELIMINARY REMARKS

There are remarkable parallels between the RIFA Program, the Branched Broomrape Eradication Program, the locust control programs, and no doubt, with other pest and disease incursions, in the range of issues that such an incursion response generates. The achievements to date, of this program and other response programs, reflect the strategic planning undertaken by the various state and national committees involved in incursion management responses.

Although the scale of the RIFA program is many times greater than most incursion response programs, there are shared experiences in virtually every facet of the operations. These experiences relate to both the external and internal working environment of the program. These parallels are reflected in recommendations that refer to the wider operating environment for this type of incursion response.

The ORP took into consideration the recommendations of the Scientific Review of the Program in October 2002 in developing their findings but do not consider it our role to comment on the acceptance, or otherwise, of these by the program. There are some common themes in both sets of findings, particularly concerning the externalities of the program. As no group seems to be responsible for their progression they may require championing by the National Consultative Committee.

RECOMMENDATIONS

THE FIRE ANT CONTROL CENTRE BASED PROGRAM

ToR 1. Appropriateness of the organisational structure to achieve the overall eradication objective

1. Program Achievements

The ORP was unanimously impressed with achievements of the program to date and the ability of FACC to function within the scale and complexity of the existing operating environment. The FACC deals flexibly and responsively, within its financial constraints, with a wide range of competing ecological, environmental, social, political and operational priorities.

The ORP found the operations well organised with staff showing a high degree of commitment to the cause and professional attitude to their tasks. We concur with the often-expressed statement around the theme “That the situation is a lot better organised, now.” This does not mean that the organisation was poorly managed, initially, but reflects the size of the task undertaken and the effort put into establishing a more efficient and effective working organisation.

Recommendation 1: *The review ORP endorses the strategic approach and organisation of the program, and recommends that the operating environment continue as it is currently established.*

2. Organisational Structure Of The Program

The RIFA program operates in a continuously changing environment. At the time of the review the program was negotiating nationally for scientific and funding resources around several options for the strategic approach of the eradication program that required next-day adoption to be successfully implemented.

Underlying this uncertainty is a program that is gradually maturing and there are several pending modifications of the organisational structure and the function of sections and individuals that could be reflected more accurately in documentation. This may be important in establishing the credentials of individuals as the program reduces in scale.

Recommendation 2: *Organisational structure and management functions be periodically evaluated and modified to accurately target and reflect the needs and changing phases of the program and its operating environment.*

ToR 2. Work planning on a seasonal and daily basis

3. Systematically Evaluate Program Risk

A systematic evaluation of program risk should be a fundamental feature of this operating environment. It should encompass emergency situations, operational accidents and natural disasters. This would not only serve to identify and address risk in a structured way, it will promote stakeholder confidence that significant contingencies are provided to ensure the greatest probability for success (and return on investment) against a background of complex parameters.

There are credible emergency situations such as loss of an aircraft and major chemical spill that have an emergency response component and follow on effect on the program timetable.

While noting that procedures were in place for accidents where trained staff provide first aid, the ORP was not able to clearly identify that all staff know the relevant emergency procedures and points of entry for communication into the Fire Ant Control Centre for likely lead response authorities.

The flexible approach to managing the program that was evident during the review will accommodate many of the natural events and biological variations that will eventuate. However, the majority of personnel interviewed were not aware of any formal process or document addressing this area. If the mechanism has been addressed, the inconsistent accounts further reflect the vulnerability to sub-optimal internal communications.

Recommendation 3: *Develop and maintain a formal risk analysis to identify areas of potential vulnerability and establish priorities for the preparation of appropriate countermeasures. Appropriate training for such credible emergency situations should also be conducted.*

4. Influencing Outcomes And Responding To Changes In A Volatile Operating Environment

Closely aligned with the risk management process is advanced consideration of or planning for contingency action in the event of significant, credible scenarios that present major program challenges or threats being realised.

The general response to a number of credible scenarios, such as -.

- major industrial action,
- sequence of prolonged adverse weather,
- unavailability of preferred aerial applicator,
- discovery of a major area of infestation not associated with established infestation boundaries

that could substantially influence program success suggested a more reactive philosophy with an expressed preference to formulate a response after the event commenced. The implications surrounding the critical elements, of both time and timing, of a significant event occurring at a critical phase in the lifecycle of this pest did not appear to have been analysed in depth. The program could be vulnerable to major slippage or failure if a significant event occurred at a strategically important juncture. Responsible contingency planning can ameliorate consequences by reducing response times for implementing remedial action.

Recommendation 4: *Consideration needs to be given to broad contingency planning as a means of advance preparation in the event of credible scenarios that could result in significant program impact.*

5. Timeliness in Response of Outside Bodies

It is almost axiomatic that the discovery of an organism that demands an incursion response will: -

- Prove to require a larger response than first anticipated.
- Require the response to continue for significantly more time than first anticipated.
- Require creation of a new, purpose driven segment of the primary response organisation.
- Require funding decisions out of synchronisation with the funding process.
- Require national support.

- Require technical input from across Australia to assist manage the response and also make funding decisions.
- Require unusual control measures outside the scope of existing approvals.

The RIFA program reported that people outside the program do not approach the task with the urgency required. A national eradication program should be able to demand and be given priority from bodies in other organisations, and its own “mother” department, eg advisory committees, to enable the decision making process to proceed in tune with the demands of the response.

Recommendation 5: *Nationally endorse the priority of programs to provide for progression of decision-making by funding bodies and technical and advisory groups to allow for timely operational planning.*

6. Access To Treatment Substances

Is it appropriate to apply the same standards of risk management for the chemicals or substances needed in an eradication program to those for more general and longer-term use?

All land within the Treatment Area need to be able to be treated. To accomplish this, it was necessary to have permits allowing the use of at least one effective and practical control option on every land use type within the Treatment Area. (See recommendation 1 of the Scientific Review Report – October 2002). The ORP was disappointed that impediments still remained that forced FACC to rely on permits, of uncertain merit, (i.e. research permits) to facilitate its treatment program in order to achieve identified targets. This practice attracts separate risks despite official APVMA ‘authorisation’. Substantial quantities of international data supports the use of preferred control agents in comparable circumstances but APVMA maintains a requirement for additional, extensive domestic validation for products to be readily available for use.

While the RIFA program now has access to the “approved” chemical treatments needed to continue with eradication, this impediment has strategic implications for rapid response and early intervention management, beyond this immediate FACC control program. The APVMA has been helpful and moved as quickly as it was able within its existing processes, however it should investigate a system for registering or approving the use of the substances in an incursion response.

Recommendation 6: *Establish a sustainable mechanism within APVMA, to facilitate rapid access to control agents for nominated uses through a system that prioritises applications for use and accommodates the urgent, emergency nature of requests.*

ToR 3. Deployment of all resources including staff in the field

7. National Resources

Unless there is a breakthrough in detection techniques, discovery will remain dependent on visual sightings. There is no alternative to this high cost surveillance process. In addition, the dictates of the urban and fringe environment mean there are no alternatives to the three systems for treatment of hand, all terrain vehicle (ATV) and aerial application of bait.

These surveillance and treatment combinations are resource hungry and means that the basic processes of the program will remain costly.

Program managers are investigating performance improvement and efficiency gains at operational levels and through scientific investigation and should be trusted to do so given that they hold unique expertise and demonstrate commitment to the program goal.

Holding this expertise will become a challenge for state and national decision makers.

Recommendation 7: *Ensure adequate resources to achieve eradication targets are maintained at the national level.*

8. RIFA Detection

The ORP recognises that the detection of RIFA across the operational area will be increasingly difficult as its occurrence approaches zero. In addition to improving the detection of low densities of ants, alternative surveillance methods are an opportunity to improve the efficiency of detection in a financial sense.

Program funded research is strongly focused on providing solutions that will assist the detection and eradication objectives of the program e.g. the HABITAT model.

Recommendation 8: *The RIFA program continues to invest in further research into alternative detection methods for enhanced confidence in identifying infestations and potential efficiency gains.*

9. Quarantine

The ORP noted that considerable progress has been made with the implementation of movement controls within and outside the RIFA treatment area. The success of these controls is highlighted by the non-detection of fire ants outside of the immediate treatment and surveillance areas since an early detection in Melbourne at the start of the program. However, controls over the interstate movement of high risk materials still remains a resource intensive exercise for the FACC Risk Management and Security team.

Businesses that produce “at risk” material are inspected for freedom from RIFA and provided with documentation to accompany consignments. Considerable effort has been given by QDPI to the development of a quality assurance system (Interstate Certification Assurance {ICA}) for businesses with ongoing production of these materials. There have been delays in the finalisation and acceptance of the ICA protocols both at the interstate level and with industry sectors. Until this matter is resolved, FACC resources will continue to be diverted to what is effectively “non-core” business. The introduction of ICA arrangements will provide a small efficiency in operations.

Recommendation 9: *QDPI expedite the finalisation of ICA arrangements for high-risk material movements so that FACC can divest responsibility for interstate certification/acceptance in favour of self-certification.*

ToR 4. Quality assurance and other control measures

10. Indicators Of Program And Functional Area Efficiency

Although the program appeared to be operating effectively (indicated by achievement of nominated milestones and deadlines) there was no measure of respective effort or cost associated with key outcomes. The ORP holds the view that the program may not be adequately demonstrating the contributions (both positive and negative) of various functions to operations and towards overall program success.

As fiscal constraints threaten to effectively reduce the ratio of resources available against an expanding area of responsibility, greater attention must be focussed on realising efficiencies across all functions. The program must be able to qualitatively and quantitatively measure performance in order to identify and prioritise areas that could be targeted for rationalisation without the introduction of false economies that might compound a deteriorating (relative) resource situation.

It is expected that relevant performance measures would also serve to provide greater transparency and confidence to stakeholders (who are, in turn, accountable to their respective organisations). The ORP regards this as a positive initiative that may prove a useful tool to support negotiations for resource allocations.

It is not the intention of the ORP to impose a burden of complex statistical calculations on management. Rather, a discrete array of simple, meaningful performance indicators should be developed and agreed in consultation with the funding stakeholders.

Recommendation 10: *Develop performance measures throughout the organisation to offer added dimensions to milestone targets and provide a measure of efficiency and net benefit to funding stakeholders. Measures should provide cross-sections at given points in time (e.g. at milestone deadlines) as ‘snaphots’ of performance plus longitudinal measures to indicate changes in performance over time. Measures from functional areas should feed into measures of overall program performance. These measures include continual monitoring and analysis of cost drivers to identify areas that can be targeted for ongoing efficiency improvement.*

11. Quality Assurance For Survey and Control

Systems are in place that assess the quality of a team’s surveying and baiting treatment. The systems, themselves, are adequate for their purpose. However, there are practical difficulties in that the assessors are not able to lay out the assessment apparatus in the small window of opportunity available to them prior to arrival of survey teams or treatment of an area.

The settled composition of teams combined with the routine tasks in known territory increases the potential for introduction of systematic errors that may not be identified through standard quality assurance monitoring. FACC assured the ORP that the risk of systematic error from this source was low but could not produce evidence that this eventuality was accommodated within their quality assurance system. Periodically varying team composition, territories and tasks will minimise this type of error by preventing the least effective teams repeatedly revisiting the same area, while still providing the known efficiency gains associated with “local knowledge”.

Team coordinators suggest that assessment is considered by them as a positive experience and will improve performance if handled appropriately. However they indicated that at times, feedback from field assessments have been delayed and often not reported formally. They believe feedback should be immediate so that it can be placed in time and context. It is hard to relate to feedback that is several weeks old.

Improvement in these qualitative factors involved in detection and treatment will improve the confidence levels applying to discovery and treatment when the population of the RIFA is very low.

Recommendation 11: *The existing quality assurance systems continue to be developed with the rapid reporting of results to field staff being a priority.*

ToR 5. Effectiveness of communication and coordination activities – with both internal and external stakeholders, including the public

12. Cultivate And Maintain Reliable Internal Communications Mechanisms

Levels of internal communication generally appear adequate, however, there is evidence of potential vulnerability that could threaten aspects of program performance. A number of issues of concern, referred to by several managers, did not appear to be being addressed in the logical forum provided by relevant business meetings. The extent of formal communication associated with individual, team and functional area performance management and feedback was not clear with some instances of apparent inconsistency in the provision of constructive feedback cited anecdotally (e.g. quality assurance monitoring of field operations). Some position roles and levels of authority were also unclear; presenting a potential threat to management credibility that may affect the program through the generation of mixed messages and miss-communication of operational direction.

The ORP was assured that QDPI corporate resources were already engaged to address this issue.

Recommendation 12: *Implement a reliable internal communications strategy to ensure consistent messages, clear lines of authority to minimise risk of miscommunication and the associated confusion of management requirements.*

13. Necessary And Productive Meetings

Consideration should be directed to the frequency, value and opportunity cost of meetings between management and operations personnel. A number of managers remarked on the perceived net benefit of the high frequency of meetings against the significant opportunity cost and disruption to continuity of core functions.

Meetings are a necessary and valuable communication device, however, caution must be exercised to ensure they remain an effective and efficient means to an end and are not seen as an end in their own right.

The internal evaluation (QDPI) of communication strategies, as mentioned in Recommendation 12 above, is expected to address this element as part of their wider appraisal of internal communications.

Recommendation 13: *Rationalise committee and business meetings for maximum return and minimum disruption to core business.*

ToR 6. Appropriateness of information system use

14. National Knowledge Retention

The program is impressive for its development of working systems in many facets of this response that have application to any incursion. The scale of the program means that the systems will apply to both large, and small exotic pest and disease incursions. They will probably remain useable for a substantial time. The preservation of the working information system where a substantial database that performs many functions is merged with spatial information is important. The ORP believes that significant credence be given to this point that the RIFA program is using these large working systems, now.

It is inevitable that the people involved in developing these systems will move on.

The significant database development that has been undertaken during this program has highlighted the need for rigorous IT involvement at the outset of incursion management programs. While the database development work undertaken for this program needs to be included as part of the “national knowledge base”, the ORP has been advised that there is work proceeding on a generic emergency response database which builds on existing state systems. A National Information Management Technical Group, on behalf of Primary Industries Health Committee, is developing this database. It builds on existing state property databases and utilises some of the RIFA systems. The ORP suggests there is a review of the RIFA software system, undertaken by IT specialists, to determine which of the elements of the RIFA system would be appropriate for incorporation into a national system. Close collaboration with experienced users of the system will enhance the final product.

Having an information management system is one thing. Using it is another. There is little time to receive training after the whistle blows. An option is to hold this knowledge in an institution such as the Emergency Management Australia Institute, Mt Macedon. In such an institution the system, which is part of the resource, can be maintained and the operators, the other part of the resource, trained over time.

It is important for future incursion management that there is a substantial debrief that includes the survival of corporate knowledge and associated systems as an agenda item and an accompanying ability to undertake the works programs that arise from it.

Recommendation 14: *Provide, at the national level, for survival of corporate knowledge and associated systems for future use in other emergency management programs.*

ToR 7. Management of staff resources – including the approach to recruitment and the appropriateness and effectiveness of training

15. Access To Adequate Human Resources Selection And Management Procedures

Constraints on sourcing, selection and management of entry level of line personnel has produced a highly diverse workforce from a wide range of socio-economic and ethnic backgrounds. The quality and capacity of the field staff is also highly variable. The program has attracted significant political and industrial relations attention that has the ability to influence program success. Absenteeism is also common and has a disproportionate impact on field operations due to the intra-dependent structure of field teams. Anticipated downsizing is expected to create further concerns. This environment presents significant challenges and requires a substantial commitment to ongoing high levels of maintenance with associated opportunity costs to managers. There was a suggestion that substantial gains in effectiveness and efficiency might be expected by recruiting fewer but better quality personnel, (e.g. achieve 80% of the work with 50% of the staff – verification and costing were not provided.) The program appears quite vulnerable to industrial action as it relies on a large labour force to perform core operational functions. Senior management was reluctant to expand on contingencies in progress because of the sensitive industrial relations environment that prevails.

Recommendation 15: *Ensure that recruitment and personnel management processes permit adequate autonomy and discretion by FACC in the application of human resource processes.*

16. Provide Human Resources and Industrial Relations Expertise

The necessarily intensive labour dependency of FACC program operations exposes program success to considerable risk from a political and industrial relations perspective. The large, diverse and complex nature of the labour force requires a sensitive approach and high-level human resource management skills to promote acceptable productivity levels with minimal disruption.

Specialist HR support is now being provided, through the appointment of a dedicated HR officer. However, the operation still relies heavily on line supervisors/managers devoting time/effort to addressing HR issues at the workforce level. Line management is not necessarily adequately equipped to deal with such matters and their efforts would be better directed towards their core functional areas. The program risks major disruption and failure from potential industrial action as well as inefficiencies associated with the opportunity costs to functional specialists.

Recommendation 16: *Provide readily available professional assistance to line management for timely resolution of industrial issues that have the potential to threaten disruption to operational effectiveness.*

17. Provide Reliable Training

In order to promote confidence in the professionalism and performance of FACC personnel, a structured, systematic and consistent approach to training should be demonstrated. Workplace diversity dictates that a complex array of techniques be employed to accommodate the full range of training requirements. However, a common starting point should be established that identifies the tasks involved and the minimum standards of competency expected.

The ORP is aware that training, by necessity, does occur but felt that it may not be applied or assessed consistently. Line level tasks are generally very straightforward and routine with most training conducted 'on-the-job' by peers and line supervisors. In the absence of a common reference datum, this approach, while expedient, is vulnerable to variation between individual trainees and trainers applying their best judgement from their own experience. This approach should be refined to promote greater confidence in eradication success.

Quality assurance monitoring provides a measure of performance feedback, but is essentially a rear-end quality control process rather than a front-end quality assurance mechanism that should ideally be built-in to the training/induction stage.

Recommendation 17: *Conduct training needs analyses to develop appropriate competency standards and delivery mechanisms to address training requirements in a structured manner.*

18. Stress Management

Stress and fatigue reduces the effectiveness of individuals and the total response. The demands of mounting an effective response creates huge personal stress for those involved and are understood by emergency response organisations. Key personnel such as the

managers in the RIFA program become critical components of the organisation and for them stress is unavoidable. There will be others at different levels of the response to whom stress becomes significant. Even the early recruits to the ground force, with their diverse backgrounds, may have experienced stress. Training in the recognition and management of stress and fatigue at all levels in the organisation will help efficiency.

Recommendation 18: *Implement mechanisms to manage vulnerability of personnel and especially key personnel to work-related fatigue and/or stress.*

19. Succession Planning

Individuals acquire critical information in a range of areas during the development and operation of unique projects such as this. These individuals are not necessarily in the upper echelons of management. This information may be about the RIFA biology, daily operations, supply of goods and services or operating systems. In rapidly moving projects the loss of these individuals creates a hiatus that, at best, impedes operations.

It is not feasible to write this knowledge into corporate documents.

The loss of these individuals is covered for short-term absences by drawing on others in the program. Groups at all levels meet on a regular basis to ensure information flow across the program. The knowledge that key people communicate during these meetings enables others to step into their roles in the short term.

The situation is more critical for medium term absences such as sicknesses and long periods of leave or departure of these people. The program is aware that retaining key staff will be a significant issue as the program progresses to more final phases in the plan.

Solutions to this issue are not obvious – although conscious introduction of some multi-skilling at management levels may provide a measure of interim relief. Developing an organisational structure that contains deputies requires considerable effort and does not ensure that either person will remain with the program.

Resolving this will require resources and hence support for the program. National funding bodies may have to consider supporting key individuals after the conclusion of their operational role within the program.

Recommendation 19: *Identify and adopt measures to preserve critical knowledge held by key individuals to minimise vulnerability to loss through staff turnover.*

ToR 8. The team will also consider and make recommendations on the approach to operations during the post-control/surveillance phase of the program in 2004/05, and in particular on an approach to scale up control activities if needed during the surveillance phase

20. Community Engagement

An effective search for the final ant may be as costly and more time consuming than the search for the first ant.

The Community Engagement program has created a large pool of trained observers who have the potential to be useful in checking for the presence of ants in the post treatment phase.

The program is planning for the post treatment phase of the program. This is rarely entered territory in eradication programs in Australia, especially in this urban and fringe environment. There are 100,000 plus landholders in the operational area. No other eradication program that is being successful has been on this scale. The landholders are a huge resource and must remain engaged as vigilantes after the final ant discovery.

Recommendation 20: *National resources support an integrated approach in the final phases of the program involving both the community and program surveyors.*

THE NATIONAL SURVEILLANCE PROGRAM

ToR 1. Appropriateness of the organisational structure to achieve the overall eradication objective

21. Organisational Structure

The diverse organisational structures that reflect the approach of each State or jurisdiction in the Surveillance plan are effective in meeting the objectives of the plan. Given this diversity, the ORP considered that it was appropriate for the Commonwealth to continue to provide the coordination of the National Surveillance Program, through the chair of the Steering Committee. The ORP believes that the medium term issue is to maintain a level of input in each jurisdiction that effectively accommodates the credible risks each jurisdiction will face.

Recommendation 21: *Maintain a level of input in each jurisdiction that effectively accommodates the credible risks each jurisdiction will face.*

22. Planning Concepts

The ORP noted that the plan is for the National Program to run concurrently with the Queensland eradication program and be complete by June 2004.

Recent new discoveries of RIFA in the operational zone in Brisbane and the associated expenditure modifications required to treat these newly discovered infestations is placing pressure on the programs ability to meet the planned eradication date.

The position of the national program in relation to the current situation is unclear. It, also, appears that the plan is to close the national surveillance program in a single step and for the States to become responsible for their own RIFA programs.

Based on consideration of the varying risks of transfer into the States and the need for continued surveillance and public awareness of RIFA the ORP believes that a risk-based approach to the National Surveillance Plan will result in a more effective national approach.

Recommendation 22: *Separate the horizons of the National Surveillance Plan from the Queensland eradication program and adopt a risk-based approach to planning.*

23. Surveillance Over Greater Queensland

Surveillance over greater Queensland outside the operational zone has been jointly “shared” between the FACC and the core business of the Animal and Plant Health Service business group within Queensland DPI. This has involved targeted surveillance by FACC throughout Queensland, principally through the distribution of RIFA identification cards via regional newspapers, accompanied by targeted active surveillance by core departmental inspection staff. The ORP was advised that, to date, active surveillance within Queensland, outside of

Brisbane, has not been funded through the National Surveillance Program component of the RIFA program funding. A formal surveillance and awareness program for Queensland has recently been developed and is being implemented, with funding assistance from the National Surveillance Program, albeit at a significantly lower level than other high risk States such as New South Wales and Victoria. The ORP believes that surveillance for fire ant in Queensland, outside the greater Brisbane area, be maintained at a level commensurate with the potentially high risk of infestation, and that national funding assistance be provided accordingly

Recommendation 23: *That Queensland maintain a high level of fire ant surveillance, outside the greater Brisbane area, in accordance with the protocols agreed to under the National Surveillance Program.*

ToR 3. Deployment Of All Resources Including Staff In the Field

24. Ability of the National Program to respond to incursions

There is some doubt surrounding the accuracy of the information held at the national level that each jurisdiction has the legislative capacity to undertake a surveillance program, or more importantly a treatment program in the light of the experiences of the operational program. There needs to be legislative support in each jurisdiction that: -

- Provides powers to enter and inspect for pests/diseases
- Provides powers to enter and treat
- Provides for treatment with the appropriate formulation in all situations.

Recommendation 24: *The chair of the Steering Committee of the National Surveillance Program reviews the legislative ability of each jurisdiction to respond to RIFA infestations.*

ToR 4. Quality Assurance and Other Control Measures

25. Quality Control for the National Surveillance Program

Reporting by the jurisdictions to the National Coordinator has been relatively prompt and detailed. However, within the present arrangements it is difficult to determine if the efforts being expended by each jurisdiction are meeting appropriate quality performance levels in relation to on-site inspections and technical ability in the recognition of RIFA. Knowledge that competent people undertake the surveys increases the level of confidence in their findings.

Recommendation 25: *Maintain a quality assurance system for field operators in the National Surveillance Program.*

26. Performance Indicators

As with the Queensland based program, the National Surveillance Program appears to be operating effectively (indicated by achievement of nominated milestones and deadlines). However, the ORP was not presented with efficiency measures. This may be important in identifying efficiencies for the various jurisdictions given their differing approaches.

Recommendation 26: *Develop performance measures for state s programs to offer added dimensions to milestone targets and provide a measure of efficiency and net benefit to all funding stakeholders.*

Report Ends

Scientific Review of the Australian Red Imported Fire Ant (RIFA) (*Solenopsis invicta*) Eradication Program

Conducted August 25-31st 2004

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Report to the National Red Imported Fire Ant Consultative Committee

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TABLE OF CONTENTS

	Page
Purpose of the Scientific Review.....	4
I. Executive Summary.....	5
II. Review of response to 2002 Scientific Review.....	11
A. Progress in meeting recommendations of the 2002 Scientific Review.....	11
B. Discussion: Considerations for use of ant mound injections.....	26
1. Lack of confidence.....	26
2. Blinding.....	26
3. Efficacy.....	27
4. Value for Money.....	28
5. Impediment to the Scientific Development of the Eradication Program.....	28
III. Review of Eradication Program to date.....	29
A. Treatment Program.....	30
1. Efficacy.....	30
2. Coverage.....	30
3. Time from treatment program to assessment and calculation.....	31
B. Protocols for treating difficult to control areas.....	32
C. Surveys of Infested Properties (IP's).....	32
D. Capture data from other survey approaches within the program.....	33
E. Use of the habitat model.....	34
F. Containment activities.....	34
IV. Post-treatment program.....	35
A. Defining eradication.....	35

B. Methods for detecting fire ant colonies.....	36
C. Surveillance coverage.....	37
D. Impact of drought conditions.....	37
E. Inlier protocols.....	38
F. Public relations/Community engagement.....	38
G. Documentation of results.....	38
H. Personnel considerations.....	39
V. Post-eradication activities.....	40
A. Maintenance of a core capacity of RIFA expertise.....	40
B. Waiving of charges for ant identification.....	41
C. Maintenance of laboratory RIFA colonies.....	41
D. Develop an ongoing surveillance plan.....	42
E. Delay in detection of RIFA.....	42
F. International collaboration.....	43
G. Preventing new incursions.....	44
VI. General Comments on Program.....	44
A. Recalcitrant Colonies.....	44
B. Treatment of SW Extension.....	45
C. Accidental treatment of monitoring plots.....	45

Purpose of the Scientific Review

To report to the Natural Resource Management Ministerial Council on the outcomes of the program to date, provide an assessment of progress and the long-term outlook of the program, and recommend any necessary alterations to the endorsed eradication program to improve effectiveness in achieving program goals

This will be achieved through: -

- A review of the scientific methodologies including the underpinning scientific assumptions, processes and R&D program.*
- An assessment of progress in meeting the recommendations of the 2002 Scientific Review.*
- An assessment of post-treatment validation processes.*
- A review of treatment, surveillance and containment activities to assess progress towards achieving goals, with particular focus on the Central Treatment Zone and the South West Extension Treatment Area.*
- Recommending any alterations to the current eradication plan, including consideration of the strategies that may be required for eliminating the last few infestations when this stage is reached.*

This review will complement the separate operational and financial audits of the program that focus on assessing management processes and efficiency measures.

I. Executive Summary

The Science Review Team (SRT), after conducting interviews and site visits in and around Brisbane, Australia from August 25-31st 2004, was impressed with the overall progress made by the Fire Ant Control Centre (FACC) to eradicate the red imported fire ant (RIFA), *Solenopsis invicta* Buren (Hymenoptera: Formicidae). The first three years of this effort has resulted in a dramatic reduction of ant populations throughout the treated area, and surveillance efforts have continued to detect some new infested areas adjacent to treatment areas, increasing the treatment area and extending the treatment period by one year. At the time of the 2004 Review, the program is scheduled to be continued for an additional period of time (2 years) to verify that this ant species has been eradicated in areas receiving the planned treatment regime.

The eradication effort has been the largest such undertaking for this pest, requiring rapid development of new techniques and procedures to accomplish the goal. Formulations of ant bait products were manufactured and registered for use locally, and application equipment was developed for use in diverse terrain and land use types. Detecting and treating extremely low densities of ant colonies that may remain after treatment has become a new scientific challenge, requiring sampling method development for use in these areas that now appear to approach eradication. The scientific underpinnings of this large-scale program remain critical to the potential success of this effort.

Regardless of reported program success to date, challenges remain. Now, more than before, Australian governments both State and Federal need to commit support to

“finish the job” undertaken. The \$175 million invested in this 7-year program must be protected and the efforts made to date to eradicate this pest, whether successful or not, need to be thoroughly documented to provide accountability.

This report details technical reviews of the many components of this eradication effort under the direction of the FACC. The SRT has focused on evaluating responses to earlier review efforts, progress made to date, considerations for completing the aim of this program, and efforts to follow thereafter. This review, however, will not be considered to be complete until after the SRT has been provided several protocols to be developed by FACC; notably (1) post-treatment assessment procedures to document successful eradication and (2) a protocol for addressing “inlier” fire ant infestations, if any, found in areas after large-scale treatment has ended.

The SRT has raised concerns that the combination of persistent dry weather conditions plus the loss of monitoring plots (infested properties or IPs) due to the use of ant mound injection treatments, may be providing an overly high sense of success in reducing overall imported fire ant populations. Tools, including insecticide products registered for all sites of infestation, must remain available or even be expanded. The Fire Ant Information System (FAIS), developed for this effort and applicable to other incursions of exotic pests nation wide, has the capacity to document program success based on treatment type(s) and surveillance method(s) or lack thereof. In addition to treatment and survey aspects, many other elements associated with this large program including public relations, community outreach efforts, containment activities, habitat and population modeling, and assessment of non-target organism impact, are important

aspects deserving of recognition for the contributions provided to the total program's success.

The many people that have been involved in this monumental effort deserve recognition and praise for a job well done, and consideration for their continued service to this program needs to be assured to successfully bring this effort to its conclusion. The documentation of the investment made to eliminate the threat from this imported pest ant is vital to the history of scientific and regulatory organizations the world over.

In reviewing this program, the SRT have formulated the following recommendations:

- **2004 Recommendation 1:** The RIFA Consultative Committee to make recommendations to the appropriate National body to have the delays to the granting of permits for the use of pesticides, experienced by the RIFA Eradication Program, fully investigated as part of a national approach for developing effective strategies for responding to biosecurity threats.
- **2004 Recommendation 2:** Consideration be given to developing a protocol when substituting surveillance for treatment to include more intensive surveillance methods than just visual inspection, such as pitfall trapping or use of attractive baits, to improve the chances of detecting RIFA infestations.
- **2004 Recommendation 3:** The search for alternative products and active ingredients (e.g. MaxForce protein bait, indoxacarb baits, "organic" materials etc.) should continue with permits for the use of promising products pursued to increase the options available for treatment, especially of difficult situations.

- **2004 Recommendation 4**: The Fire Ant Information System (FAIS) needs to be provided to National and State/Territory governments, who have jointly funded the eradication program, as a generic tool for the response to biosecurity incidents. The package supplied should contain workable instructions and hardcopy print-outs of the major functional outputs/tasks which are generically required of most incident responses.
- **2004 Recommendation 5**: Reporting on progress of the program should include mapping of all surveillance efforts (standard, pitfall, risk management inspections, submitted specimens, neighbourhood watch groups) where negative points (points where surveillance demonstrates fire ants have not been detected) and positive findings are displayed. It should also include information on the number of previously negative properties that have become positive over time and the number of positive properties that have become negative over time.
- **2004 Recommendation 6**: FACC needs to provide sufficient access of the Science Group to un-injected nests to allow for valid assessment of the performance of the standard eradication methods (including bait types and application methods) and to develop improved surveillance techniques such as the use of traps and attractant baits/food lures.
- **2004 Recommendation 7**: The RIFA Scientific Advisory Panel (SAP) review the validity, underlying science and assumptions of the nest injection technique and make recommendations as to its continued use including the development of protocols/guidelines for any remaining future use.

- **2004 Recommendation 8**: Determine efficacy of weakest treatment regime used in areas of the program to document successful eradication due to either product(s) used or treatment pattern duration.
- **2004 Recommendation 9**: The SRT suggests analyzing fipronil data (review fipronil efficacy package) from IP treatments to field verify developmental trial results; examine the number of properties treated and frequency of application.
- **2004 Recommendation 10**: The SRT recommend incorporating additional survey techniques (i.e. food lures, etc.) to enhance detection of RIFA in both treated and non-treated areas, particularly in areas where low mound numbers occur.
- **2004 Recommendation 11**: The SRT requests development of a protocol to document successful eradication following termination of treatments that outline surveillance methods, patterns, and frequency of inspections.
- **2004 Recommendation 12**: The SRT requests development of a protocol to address actions to be taken when and if active RIFA colonies are detected in previously treated “core” areas where large-scale treatment has been terminated (i.e. “inlier”), to include surveillance and treatment methods, patterns and frequencies to be used, as well as when large-scale treatment should possibly resume or when the eradication program should be modified into a containment effort.
- **2004 Recommendation 13**: FACC should seek collaboration with scientists external to the program in order to develop a mathematical model to assist with evaluating eradication success.
- **2004 Recommendation 14**: Development of at least one new RIFA detection method needs to be given a high priority.

- **2004 Recommendation 15**: The protocol for deploying an alternative surveillance method needs to be reviewed by the SRT and SAP.
- **2004 Recommendation 16**: Develop a “Rain Event” plan to ensure the opportunity for increased detection of colonies during rain events is utilized.
- **2004 Recommendation 17**: Develop a prioritized publication timeline.
- **2004 Recommendation 18**: A core capacity of RIFA expertise must be maintained post-eradication to provide identification, response to public enquiries, surveillance and conduct awareness programs. A mechanism to fund these activities should be established prior to the completion of the eradication program.
- **2004 Recommendation 19**: That no service fees be charged for the identification of ant, or suspected ant, specimens submitted as part of the ongoing RIFA (and tramp ant) awareness program, Australia-wide.
- **2004 Recommendation 20**: FACC to develop a plan to ensure that currently held laboratory colonies of RIFA are either securely contained or eliminated once eradication has been achieved.
- **2004 Recommendation 21**: FACC to develop a post-eradication plan whereby consideration is given to phasing out surveillance instead of the current complete cessation after only two years.
- **2004 Recommendation 22**: RIFA Consultative Committee to examine reasons for the time delay in detecting the ant in Queensland and seek linkage of the RIFA program with the National Threat Abatement Plan for tramp ants.

- **2004 Recommendation 23**: RIFA Consultative Committee to develop collaborative linkages with international agencies and projects such as the Pacific Ant Prevention Plan to reduce the spread of RIFA and other invasive species in our region.
- **2004 Recommendation 24**: RIFA Consultative Committee to liaise with Biosecurity Australia to develop specific strategies/protocols to prevent new incursions of RIFA into Australia.
- **2004 Recommendation 25**: FACC develop a document validating the proposed treatment program for the southwest extension area to enable the SAP to review and assess its capability of achieving eradication of RIFA.
- **2004 Recommendation 26**: FACC develop protocols to prevent the accidental mistreatment of the Science Group's monitoring plots.

II. Review of response to 2002 Scientific Review

A. Progress in meeting recommendations of the 2002 Scientific Review

The majority of those recommendations have been adequately addressed and actions implemented. Only those needing comment are addressed below:

2002 Recommendation 1: "At least one effective product must be registered for each land use type within the Treatment Area or consideration should be given to terminating the program."

At the time of the 2004 review, this recommendation has been addressed, with at least one effective product being registered by the Australian Pesticides and Veterinary Medicines Authority (APVMA – previously the National Registration

authority, NRA) to allow treatment of virtually all land use types within the Treatment Area during the 2003 treatment seasons. However, there were significant delays in gaining some permits for use which have put the eradication program at risk and which were raised as recommendations 8 and 13 of the previous review. These issues will be covered under the appropriate sections.

1. At the time of the review, permits for pyriproxyfen and methoprene had expired and these products are the mainstay of the program. While treatments were not being applied at the time of this review, the treatment season was only several weeks away and the lack of valid permits to use on the majority of the land still requiring treatment is cause for concern. Not only have the delays placed the current RIFA Eradication Program at risk but all future eradication programs requiring approval for use of pesticides or veterinary medicines are jeopardised by substantial delays in gaining such approval. The problems for this program may be largely resolved but this issue needs to be investigated as part of an overall national strategy to assist the development of effective responses to incidents.

- **2004 Recommendation 1:** The RIFA Consultative Committee to make recommendations to the appropriate National body to have the delays to the granting of permits for use of pesticides, experienced by the RIFA Eradication Program, fully investigated as part of a national approach for developing effective strategies for responding to biosecurity threats.

2. Current sites for which pesticides are not currently approved for use or are not used are very limited but include poultry pens, certified “organic” production areas, and properties belonging to people with certified “chemical sensitivities”. In these cases treatment is replaced by surveillance. As the surveillance technique currently used (visual inspection only) is reported as being only 82% effective for mound detection in sites with reasonable ground visibility, consideration needs to be given to implementing a more intense surveillance method (e.g. pitfall trapping, attractive baits) at these limited sites to ensure an increased level of detection.

- **2004 Recommendation 2:** Consideration be given to developing a protocol when substituting surveillance for treatment to include more intensive surveillance methods than just visual inspection, such as pitfall trapping or use of attractive baits, to improve the chances of detecting RIFA infestations.

3. Additional approvals for use for products such as MaxForce (protein bait) and those containing new active ingredients, e.g. indoxacarb, would usefully expand the current list of products available to the RIFA Eradication Program. These will allow for a greater range of options to be considered when treating particular areas and may be very important in developing effective strategies to eliminate intransigent RIFA populations. The intent is to keep abreast of new, effective products that may be added to the arsenal of weapons against RIFA.

- **2004 Recommendation 3**: The search for alternative products and active ingredients (e.g. MaxForce protein bait, indoxacarb baits, “organic” materials, etc.) should continue with permits for the use of promising products pursued to increase the options available for treatment, especially of difficult situations.

2002 Recommendation 2: “Funding of the program needs to be adequate and ‘phased’ so that funding is available when required – especially at the start of each season so that staff, baits and equipment are available in time for the commencement of activities in September.”

The substantial extension of the treatment area into the south-west has put pressures on the program but increased funding (to \$174.5 million) and program changes have offset these effects. The FACC management reported the previous problems have been overcome.

2002 Recommendation 3: “It is essential that controls are applied uniformly to the movement of all risk materials.”

2002 Recommendation 4: “Consideration needs to be given to developing movement control for risk products which are uniform both within Queensland and interstate and modelled on protocols developed by the USDA-APHIS for RIFA.”

Recommendations 3 and 4 appear to have been acted on with more stringent and uniform movement controls applied nationally and within Queensland.

Information on the extent to which these mirror USDA-APHIS requirements would be useful.

2002 Recommendation 5: *“More co-ordination and uniformity is required for the national surveillance effort for RIFA.”*

The national surveillance effort is reported as being improved with surveillance strategies further developed and individual States/Territories reporting to a centralised office (Office of the Chief Plant Protection Officer). No detections, excepting quarantine intercepts, of RIFA have been reported. This negative result is important to the joint investment in the eradication program in Queensland.

2002 Recommendation 6: *“A practical data management system needs to be in place by the end of this year (2002), which can reliably indicate which areas have and have not been treated for each treatment cycle.”* The data management system (known as the Fire Ant Information System, FAIS) is now outstanding and potentially useful for other eradication programs nationally. The FAIS, managed and operated by a very competent team, was able to provide prompt and detailed responses to all enquiries made by the SRT – despite the obscure nature of some of these requests. The FAIS has been developed into a very useful and functional tool and has potential for use in generic responses to biosecurity incidents Australia-wide.

- **2004 Recommendation 4**: The Fire Ant Information System (FAIS) needs to be provided to National and State/Territory governments, who have jointly funded the eradication program, as a generic tool for the response to biosecurity incidents. The package supplied should contain workable instructions and hardcopy print-outs of the major functional outputs/tasks which are generically required of most incident responses.

2002 Recommendation 7: "Reporting on progress of the program should include mapping of surveillance efforts where negative points (points where surveillance demonstrates fire ants have not been detected) are displayed".

While the FAIS has this capability, this method of reporting has been largely ignored. Reports to stakeholders do not include these maps, although maps showing negative and positive Infested Properties (IP's) have been provided in the past. It is important that stakeholders are fully informed via maps showing "negative" survey efforts where no fire ants have been detected in surveys. These maps/tables should include results of all survey types including the standard surveillance techniques (visual and pitfall, etc.) neighbourhood watch groups, site inspections by risk management staff and negative results from ant specimens submitted for identification. Different colours can be assigned to the specific surveillance type.

To date the FACC have not included in reports to stakeholders information relating to the numbers of properties which were negative for RIFA in previous surveys which, in subsequent surveys, have become positive for RIFA. While the data on overall

numbers of properties that are positive show a decline (positive IP's becoming negative for RIFA) over time and provide a good general measure of program progress, the numbers of negative properties which have subsequently become positive is an additional powerful tool in assessing both program progress and surveillance efficacy. Also, these data are important for use in any mathematical models which may be developed to help demonstrate the eradication success of the program.

- **2004 Recommendation 5**: Reporting on progress of the program should include mapping of all surveillance efforts (standard, pitfall, risk management inspections, submitted specimens, neighbourhood watch groups) where negative points (points where surveillance demonstrates fire ants have not been detected) and positive findings are displayed. It should also include information on the number of previously negative properties that have become positive over time and the number of positive properties that have become negative over time.

2002 Recommendation 8: “Delays to the treatment of all land parcels within the Treatment Area should be reduced to a minimum and, at most, should be completed by midway through the next treatment cycle.”

Significant progress has been made to resolving these problems but issues still remain. Firstly, while the FAIS has the capability of identifying which properties have received treatment (and what type) and which haven't, the follow-up is somewhat lacking. FACC reported that 15 known infested properties (not

necessarily infested now) only received a single treatment during the 2003/04 treatment season. This number was greater for properties never known to be infested and, while relatively small in terms of the total number of properties being treated, is still cause for some concern.

The late approval (Aug. 2003) of permits to finally allow the effective treatment of wetlands (the type locality of *Solenopsis invicta* being the extensive wetland Pantanal region of South America) is cause for concern. This late treatment of the sites most favourable to RIFA has effectively delayed onset of the eradication program in these areas. It is somewhat fortuitous, therefore, that the severe drought experienced in the Brisbane area during the life of the program has no doubt facilitated the treatment of many previously wetland areas and reduced the impact of the permit delays on the program. As mentioned earlier, the delayed registration of products should be investigated to prevent this compromising future similar programs. The 2002 recommendation (2002 Recommendation 8) was made because there was a perception of a lack of urgency. This lack of urgency, whether on the part of FACC, the APVMA or both organisations, appears to remain. The 2002 recommendation therefore is still valid.

It appears that it was not until about January 2003 that there was a “coming together” of field and mapping groups to demonstrate complete coverage of treatment, especially in the more difficult areas. For these areas at least, this constitutes the first true year of real treatment of the initially recommended 3-year treatment program consisting of 8 to 12 treatments over that 3-year period.

SRT is not clear on what has been surveyed and not treated (STZ, “Surveillance in the treatment zone”), treated and not surveyed. We suspect a number of sites that were not treated or surveyed. Many properties seem not to have received the prescribed number of treatments over the prescribed time. Clarification of these activities is required.

2002 Recommendation 9: *“Improved co-operation is required between individual groups of the FACC and between FACC and the rest of QDPI.”* Inter-group cooperation/collaboration has improved, but challenges remain. Particularly, the Science Group’s need to conduct in-field research seems compromised by treatment teams (eliminating mounds/nests with injections), thus preventing better assessment and documentation of: 1) effective bait treatment regimes; 2) improved survey methods such as food lures, 3) bait matrix attractancy; and, 4) treatment failures. This insistence of FACC to treat all known active nests via nest injection of insecticide needs to be reviewed to provide better balance. While the decision to treat nests via injection was reported to be made on scientific grounds based on a population modelling approach, the SRT were provided with little evidence for this. Further the SRT were concerned that this approach appeared to demonstrate a lack of belief by FACC in the recommended eradication strategy. More importantly, the nest injection practice has seriously affected FACC’s ability to assess the success of the program as much or all of its data is clouded by the effect of nest injection. This makes invalid extrapolations of

observed efficacy at known IP's to the entire treatment area, where unknown nests have not been injected. This is a serious flaw.

Pesticide permit activities and Fire Ant Control Centre cooperation continues to be essential.

- **2004 Recommendation 6**: FACC needs to provide sufficient access of the Science Group to un-injected nests to allow for valid assessment of the performance of the standard eradication methods (including bait types and application methods) and to develop improved surveillance techniques such as the use of traps and attractant baits/food lures.

2002 Recommendation 10: *“The reported ‘density-dependent/bait performance’ relationship needs to be investigated as a matter of priority.”*

The science group reported that this initial interpretation of the data may have been flawed due to uncertainties in property treatment histories. The interpretation was based on the first year's baiting where data management issues made treatment histories of individual properties difficult to determine. It now appears that the apparent poorer performance of the baits at low population densities was complicated with areas of lower RIFA population densities also receiving fewer treatments.

2002 Recommendation 11: *“The Manager of Scientific Services to be responsible for informing the Scientific Advisory Panel (SAP) of all issues which could technically impact on the eradication program.”*

This issue has been addressed and it is critical that communication continue to provide ongoing and timely reporting to the SAP.

2002 Recommendation 13: *“A single point of contact needs to be established between QDPI and the NRA with responsibility for ensuring registration permits are available for treatment of imported fire ants on all land use types.”*

The discussion in response to 2002 Recommendation 1 above is relevant. While the issue seems to have been addressed within the Department of Primary Industries and Fisheries (DPI&F) Queensland (formerly QDPI), with greater co-ordination within DPI&F, the lack of urgency referred to in the 2002 review still seems evident. The reviewers at that time suggested that resolving the delays in obtaining permits for use of the required insecticides may require communication at the “...QDPI Directorate to NRA (now APVMA) Directorate level”. This advice appears to have been ignored and significant delays in granting of critical permits has significantly hindered the program achieving its goals.

Delays in obtaining permits for the use of required control agents continue to compromise this program and other programs are placed at risk.

2002 Recommendation 14: *“Post-treatment validation techniques should include ‘brood-shift (worker to reproductive)’ methods of assessment which are appropriate where IGR insecticides are used.”*

2002 Recommendation 15: *Consider inclusion of post-treatment validation techniques utilizing histological methods of assessment of queen ovaries which are appropriate where IGR insecticides are used.*

The science group has developed the necessary expertise and implemented both of the techniques mentioned in these two recommendations as standard practice into the program. This has improved the confidence in the IGR bait treatment program regime and allowed a significant improvement in the assessment of actual treatment performance in the field.

2002 Recommendation 16: *“Comparative field efficacy studies of differently formulated baits need to demonstrate at least equivalent performance before their large-scale introduction to the treatment program.”*

This recommendation was acted on. Manufacture of baits, to the same specifications as the imported American product, within Australia has resulted in cost savings to the program and an improvement in certainty of supply. The performance of the Australian-made baits was assessed in the laboratory and in the field. Injection of nests in the field has made assessment of the performance of the Australian-made baits, in comparison to the American product, difficult to accurately determine.

2002 Recommendation 17: *“The performance of treatment sequences needs to be assessed to develop the most effective treatment strategies.”*

The enhanced program, whereby known active nests of RIFA receive an additional treatment(s) of insecticide directly injected into them, has made it difficult to determine and compare the performance of the alternative treatment types (methoprene vs. pyriproxiphen vs. hydramethylnon baits) both alone and in combination. This is most unfortunate because it has seriously undermined the program's ability to make improvements in treatment method based on scientific observation and analysis. The importance of being able to scientifically monitor and assess the performance of the various methodologies employed to eradicate RIFA would be difficult to under-estimate.

2002 Recommendation 18: *“Alternative, less labour-intensive mound treatment techniques need to be investigated.”*

At the time of the 2002 Scientific Review, mound treatment had only recently been introduced. The method used involved pressure injection of a liquid chlorpyrifos emulsion into the nests. This was seen at the time to be very labour intensive and also reasonably ineffective as one site was receiving its third round of injection treatments. Further, the previous injections appeared to cause nests to split into a series of separate nests potentially making the problem worse.

Since that review the treatment has been altered with fipronil replacing chlorpyrifos as the insecticide injected. This is reported to have increased efficacy (chlorpyrifos and fipronil estimated to be 50% and 80% effective respectively) but there appears little progress towards the introduction of less labour-intensive techniques as originally recommended.

The SRT are of the opinion that individual mound injection should not be used for the normal treatment phase of program as the product spectrum available must be documented to be sufficient to achieve eradication when applied at the recommended schedules. Mound injections simply can not be applied to all infested lands. Mound injection activities introduced into the program demonstrate lack of confidence in achieving complete elimination of RIFA populations using a multiple-application broadcast bait treatment regime, and prevent the ability to develop documentation to demonstrate that the bait treatment can achieve eradication.

2002 Recommendation 19: *“An increased effort is required to maximise the use of aerial application of bait treatments.”*

The SRT are satisfied that this has been achieved with a reported 52% of the treatment area receiving aerial application of baits.

2002 Recommendation 20: *“The use of domestically formulated bait materials is encouraged dependent on them being proven equally effective as imported product in the field.”*

This has been achieved and also discussed in Recommendation 16 above.

2002 Recommendation 21: *“The performance of IGR only bait options (especially methoprene only) needs to be investigated.”*

As discussed above, (see Recommendation 17) it has been difficult to assess the performance of individual treatment types due to the practice of injecting surviving nests with insecticide in IPs. The SRT were presented with a short paper by Cas Vanderwoude and Evan J. Harris titled "Analysis of effectiveness of IGR only and IGR+hydramethylnon treatment" as Attachment 6 to 2002 Scientific Review response. In the first part of this paper, the Fire Ant Information System (FAIS) was queried as to determine if treatment history could be correlated with observed efficacy. This query reported that 202 known infested properties (IP's) had received IGR-only treatments with a control rate of 95.0% being reported at a mean number of treatments of 8.06 (± 2.77). Two IP's remained active. However, as the authors acknowledged, this is not a random sample. It was a sub-sample of the total population of nests where nests were not injected. It is highly probable that this has substantially biased the sample to those known IP's where the IGR treatment only has been effective. In other words, by excluding nest injection, the sample is one where the IGR treatment alone has been successful and this is likely to substantially overestimate the actual efficacy of the IGR-only treatments. The paper also reports on the assessment of 'Fixed Monitoring Plots' where nest injection was not used. This is a far more useful tool for assessing this issue. However, only 9 plots were involved, two where methoprene only has been applied and 7 where methoprene and pyriproxiphen only have been applied. While figures were not presented and graphs of ants trapped did not indicate what treatments had been applied, it was reported that RIFA had been controlled at all the sites. This issue is particularly important for the new

Southwest Extension where the entire area is to receive IGR-only treatments aurally. Also, in this south-west extension area, surveillance is of a lower intensity with the low human population density and lack of on-ground observations from hand-treatment teams. Therefore, the majority of the south-west treatment area will have to rely on the efficacy of IGR treatments only. Further, the reliance on the performance of IGR-only treatments is significantly greater since the plan is to reduce the treatment period of this area to only two years.

2002 Recommendation 22: *“Assessing bio-control options.”*

This recommendation was not supported by FACC or the Consultative Committee and hence not followed further.

2002 Recommendation 23: *“Adequate resourcing to minimize health /family effects.”*

This was supported but considered outside the ‘Terms of Reference’ of the previous Science Review.

B. Discussion: Considerations for use of ant mound injections

The points below centralise a lot of the discussion relating to nest injection which was raised in several sections of the assessment of the responses to the 2002 review above.

Issue: Enhanced Program of Treatment of Known Active RIFA Nests.

Near the time of the 2002 Scientific Review, FACC introduced an 'enhancement' to the treatment program which involved the treatment of all known active RIFA nests by pressure injection of insecticide emulsion. The SRT have concerns about this 'enhancement' on a number of levels.

1. Lack of confidence: It appears to demonstrate a lack of belief by FACC in the originally planned eradication strategy and a lack of confidence in achieving complete elimination of RIFA populations using the multiple-application broadcast bait treatment regime used in most of the land area (surveyed and non-surveyed).

1. **2. Blinding:** A consequence of implementing the additional insecticide injection treatments to all known active nests is that it 'blinds' FACC management to the performance of the standard program' in the remaining 95+% of the treatment area. The FACC place high importance on the IP surveys to demonstrate acceptable progress in the RIFA eradication program. However, the nest injection practice has seriously affected FACC's ability to assess the success of the program as all of its data is clouded by the effect of nest injection. This makes invalid extrapolations of observed efficacy at known IP's to the majority of the treatment area, where unknown nests have not been injected. It therefore prevents the ability to develop documentation to demonstrate that the treatments used in the majority of the treatment area are effective. These are serious flaws.

3. Efficacy: While the decision to treat nests via injection was reported to be made on scientific grounds based on a population modelling approach, the SRT were provided with little evidence for this. There was no information provided on the underlying assumptions used in the model such as: a) the assumed efficacy of the nest injection technique; b) the assumed efficacy of the standard program treatments and; c) the estimated number of nests that remain undiscovered in the treatment area. Further, there appears to have been no ongoing analysis of this technique with updated modelling performed on the known efficacy of injection versus that which was assumed. For instance, the injections with chlorpyrifos appeared to cause nests to split into a series of separate nests potentially actually detracting from the standard program. Chlorpyrifos has since been replaced by fipronil as the insecticide injected. This is reported to have increased efficacy (chlorpyrifos and fipronil estimated to be 50% and 80% effective respectively) but there appears to have been no ongoing analysis. It should also be remembered that the nest injection technique was introduced prior to the improved methods of assessing the performance of the IGR's via 'brood-shift' and histological techniques. This would have altered considerably the underlying assumptions used in supporting the original decision to implement nest injection.

4. Value for Money: It is questionable whether the nest injection returns sufficient improvement in program performance to justify the extra resources it requires. Nest injection is very labour intensive and can be reasonably ineffective – the White Rock site received at least three rounds of injection to achieve control of nests.

5. Impediment to the Scientific Development of the Eradication Program: The Science

Group's need to conduct in-field research is seriously compromised by treatment teams eliminating mounds/nests with injections thus preventing better assessment, analysis and documentation of: a) effective bait treatment regimes including the determination and comparison of the performance of the alternative treatment types (methoprene vs pyriproxiphen vs hydramethylnon baits) both alone and in combination and comparative analysis of bait sequencing options; b) improved survey methods such as use of food lures, defined aperture traps, subterranean traps, etc.; c) assessment of the performance of the Australian-made baits in comparison to American products; d) comparative bait matrix attractancy; and, e) treatment failures.

The enhanced program, whereby known active nests of RIFA receive an additional treatment(s) of insecticide directly injected into them, has seriously undermined the program's ability to make improvements in treatment method based on scientific observation and analysis. The importance of being able to scientifically monitor and assess the performance of the various methodologies employed to eradicate RIFA would be difficult to under-estimate. This insistence of FACC to treat all known active nests via nest injection of insecticide needs to be reviewed to provide better balance.

The SRT are of the opinion that individual mound treatment such as injection should not be used for the normal treatment phase of the program when the assumption has been made that the regime of bait treatments would provide

eradication in areas where it can be applied. However, for the inlier protocol (inlier being surviving RIFA within an area where treatment has been finalised and now under 100% surveillance to prove eradication), faster-acting bait plus contact treatment regimes could be included (i.e. MaxForce protein bait for mound and broadcast treatments, hydramethylnon, indoxacarb, spinosad, abamectin, fipronil granules, orthene, carbaryl etc.) where considered appropriate.

- **2004 Recommendation 7:** The RIFA Scientific Advisory Panel (SAP) review the validity, underlying science and assumptions of the nest injection technique and make recommendations as to its continued use including the development of protocols/guidelines for any remaining future use.

III. Review of Eradication Program to date

The SRT emphasizes the critical need and value of the science team, particularly in this final phase of the program.

A. Treatment Program

1. Efficacy. Over-all efficacy versus efficacy of treatment types/regimes (include time element, habitats, years). The treatment program's 99.4% control is excellent and selected treatment programs seem to be successful. However, as the caveat acknowledged in Attachment 6 to 2002 Scientific Review response (see previous discussion on p.25), this figure is not based on a random sample of colonies, so it can not be extrapolated to the entire program. There remains a

need to clarify this percent control figure to acknowledge the different “mosaics” of treatment regimes and variability of efficacies. Detecting and eliminating remaining colonies at low densities is the current challenge facing successful eradication.

- **2004 Recommendation 8**: Determine efficacy of weakest treatment regime used in areas of the program to document successful eradication due to either product(s) used or treatment pattern duration.
- **2004 Recommendation 9**: The SRT suggests analyzing fipronil data (review fipronil efficacy package) from IP treatments to field verify developmental trial results; examine the number of properties treated and frequency of application.

2. Coverage. FACC should not confuse results from treated surveillance infested properties (IP's) as surveyed-only IP's, as this will potentially generate an elevated level of program success. Documentation needs to clearly show which properties were treated but not surveyed, and surveyed but not treated. Negative survey results using visual methods (an 82% effective method as documented by an internal study) alone may fail to detect subterranean or incipient colonies, particularly during hot, dry weather. Any properties not receiving a full regime of treatments (3,300 or 3%?) need to be identified and lack of full treatment

explained or justified. These properties will require extra surveillance and/or treatment to complete the program.

- **2004 Recommendation 10:** The SRT recommend incorporating additional survey techniques (i.e. food lures, etc.) to enhance detection of RIFA in both treated and non-treated areas, particularly in areas where low mound numbers occur.

3. Time from treatment program to assessment and calculation

Suppression of imported fire ant populations as documented by ant mound or nest numbers per unit area or other methods occurs at and for some interval of time (dependent on treatment program and products applied) in areas where re-infestation is likely to occur. If untreated areas persist within or adjacent to treatment program areas, re-invasion of previously treated areas is likely. Level of “control” or “eradication” would therefore change over time following treatment. Data need to be analyzed to verify that maximum percent control reported is being maintained to justify this figure as an indicator of successful eradication.

- **2004 Recommendation 11:** The SRT requests development of a protocol to document successful eradication following termination of treatments that outline surveillance methods, patterns, and frequency of inspections.

B. Protocols for treating difficult to control areas – Where imported fire ants seem to be surviving in previously treated areas, a protocol for analyzing these

situations needs to be established. Every opportunity needs to be used to learn about treatment failures/challenges and biological behavioral responses of fire ants to survey/treatment methods in the field. First, an analysis of the property's history (disturbance, invasion/re-invasion, treatment regime, survey history) should be undertaken. Secondly, surviving ant mounds need to be marked (into treatment groups or clusters containing 3 to 6 or more mounds, if possible) and utilized to conduct in-field research to determine: 1) acceptance of products/bait attractants; 2) attractiveness to food lures/buffet. Although injection of these colonies with a contact insecticide (i.e. fipronil or chlorpyrifos) is discouraged, when they are located within the core treatment area, where treatment has been discontinued, or contain winged reproductive ants, they could be eliminated soon after research is completed (i.e. 48 hours). Further, injection of nests should only be used if the review of this method, as per 2004 Recommendation 7 above, is demonstrated to improve the overall efficacy of eradication. Other activities could include field validation of treatment(s) and survey type efficiency.

C. Surveys of Infested Properties (IP's) – IP numbers are expected to decay over time, thereby documenting eradication program success. Also, properties previously found free of imported fire ant should remain free. Constraints on surveillance (visual methods, only) include: 1) documented 82% efficacy; 2) drought conditions possibly causing ant activity to become subterranean, and; 3) habitat such as heavy vegetation and steep slopes, etc. Thus, research efforts in IP's could add science-based methodology to improve surveillance and treatment

methods and provide better documentation of program success. Activities in these areas could include:

1. Evaluation of traditional or novel baits, food lures, or devices/dispensers (e.g. sub-surface pitfall trap) could be conducted in IP's with active populations to contrast with methods currently in use (e.g. visual, surface pit-fall traps).
 2. Investigate the history of IP's (as well as for parcels of land that were not IP's, if possible) that were found to become infested after an initial survey indicated the property/parcel as ant-free to assess the reasons (e.g. fly-in, invasion, survey failure, drought, habitat, etc.).
- **2004 Recommendation 12**: The SRT requests development of a protocol to address actions to be taken when and if active RIFA colonies are detected in previously treated "core" areas where large-scale treatment has been terminated (i.e. "inlier"), to include surveillance and treatment methods, patterns and frequencies to be used, as well as when large-scale treatment should possibly resume or when the eradication program should be modified into a containment effort.

D. Capture data from other survey approaches within the eradication program (e.g. community watch, hazard materials movement, site inspections of phone-in or specimen verification efforts). In addition, buffer area surveys from pre-expansion of treatment area could be used as surveyed properties (SP's) or pre-IP's to document imported fire ant distribution changes and/or spread, or lack

thereof. Additionally, integrate any information for native/competitor ant distribution and bait treatment responses if possible. Consider mapping the location and type of imported fire ant-related research (e.g. non-target organism studies) conducted in conjunction with the eradication program effort to be posted on the program's web site.

E. Use of the habitat model. The use of this model resulted in an increased efficacy of finding imported fire ant infestations during “seek-and-destroy” survey and treatment phase of the eradication effort. However, use of model may change during the post-treatment validation phase as even colonies remaining in the least suitable habitats can potentially cause the eradication effort to fail. The model is best suited for use in scheduled survey efforts *around* treatment boundaries (buffer survey zone), not in the core treatment area(s) for validation.

F. Containment activities – efforts should continue using current methods until the area is declared free of fire ants. Use data generated for documenting survey efforts for post-treatment validation.

1. Other surveillance (integration of data). Incorporate all survey efforts as distinct colours on map (much like various treatment types and application methods maps).
2. Staff should receive standard QA appraisal of their performance.
3. Consider adding additional survey techniques (i.e. food lure survey) to enhance visual inspection methods for pre- and post-disturbance sites.

Addition of later surveys of disturbed sites may be useful in detecting ant establishment in these habitats.

IV. Post-treatment program

The original plan was that eradication could be claimed if no active fire ant populations were found after 2 years of intensive survey efforts. However, a detailed protocol/procedure to address the challenge of validating eradication success has not been submitted to the SRT. It is not possible to fully review this program without this detailed information, but we have identified the following issues which need to be addressed:

A. Defining eradication. FACC should consider any/all appropriate mathematical models that provide assistance for defining eradication feasibility and success to guide validation activities (e.g. University of Queensland, Weeds CRC, Scanlan model, etc.). Results will assist in deciding on the appropriate spatial and temporal aspects of a surveillance strategy. Criteria for success, as well as criteria for modifying program goals (i.e. to active containment or IPM program development) should be considered. For instance, if the cost of validation survey plus inlier control efforts approach the cost to retreating the entire area, the validation program efforts should be reconsidered.

- **2004 Recommendation 13**: FACC should seek collaboration with scientists external to the program in order to develop a mathematical model to assist with evaluating eradication success.

B. Methods for detecting fire ant colonies. The ability to demonstrate and document the ability to detect colonies is critical to the outcome of the program. The deployment of several detection methods will be necessary because it will become increasingly difficult to detect fire ants as the extent and activity of the colonies decline. At least one new technique needs to be urgently developed. Consider alternative survey techniques (e.g. food lures, pitfall traps, subterranean sampling methods, trained dogs or bees, defined aperture traps, filter papers, phago-stimulants as discussed in the Fire Ant Workshop, Aug. 23-24, 2004). If a bait is used, then it needs to be different to that used during the treatment program, because it is possible that foragers will now avoid this bait.

Any new technique will need to be scientifically tested in the field, although this should have been undertaken earlier while ants were more prevalent. Current use of active colonies anywhere in the program area should now be used to evaluate new survey methods. Any written protocol developed should be submitted to the SRT and SAP for review prior to or soon after entering this phase of the program.

- **2004 Recommendation 14**: Development of at least one new RIFA detection method needs to be given a high priority.

C. Surveillance coverage. The current “visual observation of surface ant activity” should be continued and applied to all properties in the previously treated area. In addition, new techniques should be deployed in as many sites as logistically possible.

Pitfall traps will need to be used at some sites, particularly in areas difficult to access, but also in a limited number of reference sites.

- **2004 Recommendation 15**: The protocol for deploying an alternative surveillance method needs to be reviewed by the SRT and SAP.

D. Impact of drought conditions. The Brisbane region has experienced drought conditions for the last 2 or more years, and this is likely to decrease the ability to detect surface ant activity. Whilst these drought conditions persist there is an increased probability that incipient colonies will be missed. It will be necessary to continue to survey ants even in drought conditions, but a plan should be developed to maximize the opportunity for increased detection whenever there are saturating rainy periods. This should include a priority list of properties for systematic surveys during wet periods e.g. select some IPs for survey within 1 week of a saturating rain event. There should also be a plan of how to engage the public in additional searching after a rain event.

- **2004 Recommendation 16**: Develop a “Rain Event” plan to ensure the opportunity for increased detection of colonies during rain events is utilized.

E. Inlier protocols. Inlier fire ant infested properties are currently dealt with using the previously developed outlier protocols. However, modifications should be considered including use of more rapid ant-elimination methods (e.g. hydramethylnon, indoxacarb).

F. Public relations/Community engagement. SRT recommends a change in emphasis of effort to assist in the validation process (e.g. 1) community watch programs active within previous treatment zones; 2) news releases/PR program for engaging the public to assist ant detection efforts focusing on improved ant-finding suggestions such as finding ants in leaf litter on rooftops, swimming pools, with food lures and searching particularly after rain events). The PR program should acknowledge existence of inliers and outliers (i.e. 0.6% of properties with infestations). Consider providing bait samples or lure suggestions to the public.

G. Documentation of results. It is crucial that the results of this program are well documented. This will provide an invaluable resource both nationally and internationally. Where appropriate, it is important that papers are published in refereed scientific journals. This not only makes the information available to a wide audience, but also facilitates scientific peer review of the program outcome. This process needs to be part of the eradication plan and preferably undertaken by existing science staff (see personnel considerations below).

Maps and tables depicting all surveillance efforts (active, passive, buffer, IP, community watch, high risk) should be generated regularly depicting success in not finding ant activity (i.e. negative data) and distributed to appropriate personnel including SAP. We suggest that maps are produced that depict local Brisbane, Queensland and the 'whole-of-Australia' surveillance effort.

- **2004 Recommendation 17:** Develop a prioritized publication timeline.

H. Personnel considerations. As the eradication program nears completion it is likely to become an increasingly difficult task to retain and engage staff at all levels. However, it is vital to ensure completion of validation tasks to the same current high standards. The following suggestions should be considered:

1. Identify and appoint key staff for the post-eradication phase well before the end of the current program.
2. Give staff a vision for a post-program structure.
3. Scientific staff will need to be retained post program to ensure completion of documentation of results. It is likely to take at least 2 years to complete the publication process. Ideally this needs to be done by the same staff that carried out the research as it is extremely difficult to write-up someone else's research.
4. Implement group/management meetings e.g. operations and science teams to discuss application use intervals; mapping and science teams to map science project properties/data.

Develop contingency plans in case the program goal changes e.g. biological control, IPM, aggressive containment.

V Post-eradication activities

Once eradication of RIFA has been declared, there will be an ongoing requirement for a range of operational and awareness activities to occur to safeguard the considerable investment already made and to prevent new incursions.

There is a need to develop a post-eradication strategy that includes at least the following considerations:

- A. Maintenance of a core capacity of RIFA expertise.** There is a need to maintain a core of RIFA expertise for identification, response, surveillance inside and outside the treatment zones, knowledge, and public relations/education. This long-term program could include the maintenance of the DPI&F call centre number, 'flying' squads to respond to suspect sightings, taxonomic support and publicity campaigns. Local Government (Councils) are likely to have an important role in promoting and maintaining community awareness. The assistance of Councils and appropriate community groups (bushwalkers, environment watch groups) and industry (Real Estate) should also be enlisted in post-eradication surveillance efforts. Ways of funding these activities should be explored now and a mechanism set in place prior to the completion of the eradication program.
- **2004 Recommendation 18:** A core capacity of RIFA expertise must be maintained post-eradication to provide identification, response to public enquiries, surveillance and conduct awareness programs. A mechanism to fund these activities should be established prior to the completion of the eradication program.

B. Waiving of charges for ant identification. Engagement of the public in general surveillance, as employed in this eradication program, is likely to be part of the post-eradication strategy. Experience in many jurisdictions has shown that

charging a fee for identification of specimens is a significant disincentive for public and industry participation in such programs and is therefore counterproductive. DPI & F currently charges fees for insect specimen identification ranging from \$25 to \$250 depending on whether the specimens are submitted by the public or by commercial interests and on the level of identification required (whether to Family, Genus, species). Such charges should be waived in the case of ant or suspected ant submissions.

- **2004 Recommendation 19**: That no service fees be charged for the identification of ant, or suspected ant, specimens submitted as part of the ongoing RIFA (and tramp ant) awareness program, Australia-wide.

C. Maintenance of laboratory RIFA colonies. A plan should be developed to ensure that these colonies are either securely contained or eliminated once eradication has been achieved. This should include a risk assessment and consideration of using certified quarantine facilities or upgrading current facilities to full quarantine status. There will be an ongoing need for laboratory colonies for training purposes and experimentation until eradication is achieved.

2004 Recommendation 20: FACC to develop a plan to ensure that currently held laboratory colonies of RIFA are either securely contained or eliminated once eradication has been achieved.

- D. Develop an ongoing surveillance plan.** While the original plan proposed a three-year treatment phase followed by a two-year surveillance phase, it is likely that an extended tail of surveillance, possibly diminishing over time, will be required to offer the required degree of protection of the investment into eradication. FACC should be mindful of the delay between the completion of treatment and the recovery of surviving RIFA populations to the point that they can be detected. The effect of IGR's can endure for considerable periods of up to 18 months and so populations can be depressed below detection levels for the majority of the current planned surveillance phase. The surveillance plan should include continued efforts to monitor movements of high-risk materials and disturbed lands to detect potential ongoing spread of RIFA.
- **2004 Recommendation 21:** FACC to develop a post-eradication plan whereby consideration is given to phasing out surveillance instead of the current complete cessation after only two years.

E. Delay in detection of RIFA. Red Imported Fire Ants were established in Brisbane for a considerable period (estimated in excess of 10 years) before they were detected. This delay has affected both the cost of the eradication program and its chances of success. The particular circumstances that led to this delay should be investigated to improve the chances of detecting future incursions of this, or other serious exotic tramp ant species, being detected in a reduced time from initial invasion. There is currently a national initiative to develop a 'Threat Abatement Plan' (TAP) for tramp ant species. The RIFA Consultative Committee

may be able to coordinate with this initiative to develop strategies to improve the response to incursion of tramp ants post-eradication of RIFA.

- **2004 Recommendation 22**: RIFA Consultative Committee to examine reasons for the time delay in detecting the ant in Queensland and seek linkage of the RIFA program with the National Threat Abatement Plan for tramp ants.

F. International collaboration. Internationally, there is also a focus on the threat to regional economies, trade, plant, animal and human health and biodiversity posed by tramp ant species. In the Pacific for example, the Invasive Species Specialist Group of the World Conservation Union (IUCN) is coordinating a project to prevent RIFA and other invasive ants from entering and establishing in the region. There are obvious benefits for Australia in participating in such projects.

- **2004 Recommendation 23**: RIFA Consultative Committee to develop collaborative linkages with international agencies and projects such as the Pacific Ant Prevention Plan to reduce the spread of RIFA and other invasive species in our region.

G. Preventing new incursions. An important consideration in declaring a successful eradication is having effective systems in place for prevention of new incursions of that pest. In association with other activities on threat abatement it is appropriate to review, and if necessary refine, protocols for preventing new incursions of RIFA into this country.

- **2004 Recommendation 24:** RIFA Consultative Committee to liaise with Biosecurity Australia to develop specific strategies/protocols to prevent new incursions of RIFA into Australia.

VI General Comments on Program

- **A. Recalcitrant Colonies :** The failure to achieve eradication of RIFA in certain areas despite multiple treatments needs to be thoroughly investigated and individual treatment plans carefully developed. The continued existence of surviving fire ants at the nursery in Progress Rd, near the 'ground-zero' of the Richlands/Wacol infestation is concerning. In this case there are two areas close by which could have acted as points of re-infestation – the bush area less than 100m away in which treatment was significantly delayed and which had very active RIFA colonies and a vegetable garden across the road which had many active colonies (due to the inability to treat effectively because of the vegetable production?) only last year. However, this and surrounding properties has possibly had the most intense and frequent treatment and alternative explanations should be considered. For instance, the 'mode of action' of some fast-acting ant bait products may affect foraging behaviour. The active ingredient spinosad is a direct toxicant and can have the effect of killing the foraging (oldest) workers. If this occurs, the nest can still have significant ant numbers, but few are foraging so exposure to subsequent baits may be diminished. Under these circumstances RIFA, with their extensive underground gallery systems, may be able to survive on subterranean food sources. The full

range of treatment types needs to be carefully considered to ensure recalcitrant colonies are eradicated.

B. Treatment of SW Extension: The two-year treatment program, currently being undertaken in the south west extension area, differs significantly from the original plan consisting of three years of treatment and should be assessed by the RIFASAP for its capability of actually achieving eradication. The FACC now have substantially more information available to it from the experience of the eradication program in the original Central Treatment Zone than existed at the commencement of the program. This information needs to be used to develop the case for assessing the validity of reducing the treatment period from 3 years to 2 years.

- **2004 Recommendation 25:** FACC develop a document validating the proposed treatment program for the southwest extension area to enable the SAP to review and assess its capability of achieving eradication of RIFA.

C. Accidental treatment of monitoring plots: The Science Group has experienced problems in the past with accidental treatment of their monitoring plots. In these cases, this has significantly affected their ability to assess treatments and undertake valuable scientific research sometimes resulting in an inability to provide data required by the APVMA. FACC need to develop protocols to prevent such accidental mistreatment. Possibilities include clear physical

marking of the sites and, in the case of applications involving use of GPS,
electronic marking of trial areas.

- **2004 Recommendation 26**: FACC develop protocols to prevent the accidental mistreatment of the Science Group's monitoring plots.

DAF RTI DL Release

**Department of Primary
Industries and Fisheries -
Fire Ant Control Centre
Performance Audit
3 August 2005**

DAF RTI DL Release

Mr Keith McCubbin
General Manager
Fire Ant Control Centre
81A Seventeen Mile Rocks Road
OXLEY QLD 4075

3 August 2005
Our Ref: 175673

Dear Keith

Re: Fire Ant Control Centre Performance Audit

Please find attached our final report presenting the findings and recommendations of our recently completed performance audit of the Fire Ant Control Centre (FACC).

Please do not hesitate to contact Richard Ward on 3308 7224 or me on 3308 7209 if you wish to discuss any aspect of our report.

Yours sincerely

sch4-Signature

Irene Austin
Partner

Contents

1	Executive Summary	4
	1.1 Introduction	4
	1.2 Key Finding	4
	1.3 Summary of Key Recommendations	4
2	Audit Objective and Scope	6
	2.1 Basis of the Audit	6
	2.2 Objective	6
	2.3 Scope	6
3	Performance Audit Approach	7
	3.1 Our Approach	7
	3.2 Documentation Reviewed	7
	3.3 Persons Interviewed	8
4	Background	9
	4.1 FAEP Overview	9
	4.2 FACC Expenditure 2004-05	10
5	Findings and Recommendations	14
	5.1 Introduction	14
	5.2 Overview	14
	5.3 Field Staff	16
	5.4 Outsourcing	22
	5.5 FACC Organisation Structure	23
	5.6 Vehicle Fleet Utilisation	27
	5.7 Motor Vehicle Management	29
	5.8 Alternate Data Entry Capture	29
	5.9 FAIS - Automatic Job Creation	30
	5.10 Operations Delivery Business Processes	31
	5.11 FSIS – Field Equipment Allocation	33

5.12 FACC Risk Management	33
5.13 Site Location	34
5.14 Alternative Surveillance and Identification	34
6 Further Recommendations	36
6.1 FAIS	36
6.2 Electronic Field Capture Units	36
Appendix A	37
FACC FTE Breakdown	37
Appendix B	38
Statement of Responsibilities	38

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1 Executive Summary

1.1 Introduction

Deloitte Touche Tohmatsu (Deloitte) has completed a performance audit of the Fire Ant Control Centre (FACC) which is largely responsible for the implementation of the National Fire Ant Eradication Program (FAEP). The aim of this program is to eradicate the Red Imported Fire Ant (RIFA) from Australia through a schedule of baiting for a period of three years that commenced in June 2001 followed by two years of surveillance.

The engagement was completed in accordance with Schedule One, Terms of Reference, of the consultancy agreement, number PIO0034, signed 11 April 2005.

This engagement was conducted in a manner consistent with Australian Auditing Standard (AUS) 806 *Performance Auditing*. It was conducted in April and May 2005. The report's findings should be read in the context of our Statement of Responsibilities outlined in Appendix B.

1.2 Key Finding

Our key finding is that the FACC is achieving the objectives of the FAEP and is operating efficiently. We also commend the culture within the FACC of continuously seeking further efficiencies. As a result of this review, we have identified areas where further efficiencies could be gained. These are detailed in Sections 5 and 6 of this report.

1.3 Summary of Key Recommendations

To assist management increase the efficiency and effectiveness of business processes we have made a number of recommendations throughout our report. In some cases, successful implementation of these recommendations will provide FACC with direct cost savings.

Tabled below are our key recommendations to assist management in this regard:

Issue	Key Recommendations	Section
Field Staff	The monitoring and enforcement of the minimum requirements of the field staff's employment, such as attendance, appropriate behaviour and time spent in the field need to be reinforced.	5.3
	Implement incentive programs to drive performance of field staff.	5.3
Outsourcing	External labour sourcing options for surveillance should be investigated and costed as a strategy to adopt from 1 July 2006.	5.4

Issue	Key Recommendations	Section
FACC Organisation Structure	To better align the current FACC organisation structure, we recommend that management implement a revised structure	5.5
Vehicle Fleet	The motor vehicle fleet can be significantly reduced without impacting the FACC's ability to deliver on its objectives.	5.6

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2 Audit Objective and Scope

2.1 Basis of the Audit

The audit was completed in accordance with Schedule One, Terms of Reference, of the consultancy agreement, number PIO0034, signed 11 April 2005.

Both the audit objective and scope are defined in the Terms of Reference.

2.2 Objective

The audit objective was to review and recommend improvements to the overall efficiency of the FACC Business operations to establish opportunities to reduce organisational overheads and costs (without compromising the effectiveness of the eradication program) as the program moves toward completion in June 2007.

2.3 Scope

The audit scope covered a review of:

- All FACC business functions including:
 - the strategic and business planning process, including, business unit operational planning
 - the effectiveness and efficiency of management structures, internal controls, and delegations
 - business unit accountabilities and target outputs
 - business procedures and processes.
- the organisational structure and its effectiveness for achieving the desired outcomes of the FAEP.

It should be noted that in performing this engagement, we have focused on the 2004-05 financial year and the project moving forward with an emphasis on major expenditure to be incurred. We therefore have not performed a retrospective review in terms expenditure or decisions made in previous financial years. This was based on discussions with the General Manager when defining the terms of reference at our workshop on 13 April 2005.

3 Performance Audit Approach

3.1 Our Approach

The approach that we adopted in undertaking this performance audit included:

- agreement on audit scope and objectives
- finalisation of project plan
- a workshop with management to identify key risks and issues
- discussions with management and other key personnel
- review of documentation such as previous internal audit reports, risk assessments and other program information
- identification of core and non core business functions
- review of the delegations in place
- identification of overhead and cost reductions
- development of a report including recommendations for discussion with management.

3.2 Documentation Reviewed

In undertaking this performance audit, we reviewed the following documents provided to us by management:

- National RIFA Eradication Plan August 2004
- National Fire Ant Eradication Program Progress Report June 2001 – February 2005
- Operations Review of the Red Imported Fire Ant Eradication Program October 2003
- FACC Corporate Documents
 - FACC Risk Management Register
 - Business Plans
 - Operations Delivery
 - Operational Plans
 - Scientific Services
 - Project Plans 2004-05
 - Community Engagement
 - Information Services
 - Risk Management and Security
 - Public Relations

- Scientific Reviews
 - Scientific Review of the Red Imported Fire Ant Eradication Program – Report to the RIFA – National Red Imported Fire Ant Consultative Committee October 2002
 - Scientific Review of the Australian Red Imported Fire Ant Conducted August January 2005
- Internal Audit (DPI&F)
 - Draft Report, Audit of Fire Ants Control Centre, February 2005

3.3 Persons Interviewed

In undertaking this performance audit, we held discussions with the following FACC personnel:

- Jenny Bibo – Manager Public Relations & Training
- Marlene Elson-Harris – Principal Scientist Scientific Services
- Jason Haffenden – Manager Risk Management & Security
- Evan Harris – Laboratory Manager
- Michael Hough – Planning and Reporting Officer
- Craig Jennings – Principal Policy Officer
- Harry Koch – Business Manager
- Keith McCubbin – General Manager
- Michelle Milzewski – Manager Community Engagement & Industry Liaison
- Cara McNicol – Manager Operations Resources
- Ray Moore – Mapping & Information Systems
- Neil O'Brien – Human Resources Manager
- Kris Plowman – Scientific Services
- Jason Reberger – Manager Operations Delivery
- Pat Smith – Manager Administration
- Mark Stevenson – Acting Manager Operations Delivery
- Than Tran – Management Accountant

4 Background

4.1 FAEP Overview

Following the discovery of the Red Important Fire Ant (RIFA) in Brisbane on 22 February 2001, the Fire Ant Control Centre was established in response to the implementation of the National Fire Ant Eradication Program (FAEP). The FAEP is funded, under the control of the Natural Resource Management Ministerial Council, through cost sharing arrangements involving the Commonwealth and the States with a total contribution of \$175.4 million over six years. The program is scheduled for completion in June 2007.

The area encompassed by the eradication program is in excess of 105,000 hectares (ha). This includes approximately 225,000 land parcels – 1,250 of which are known to have been infested at some stage during the eradication program.

The aim of the FAEP is to eradicate RIFA from Australia in accordance with the following schedule:

Financial Year	Schedule	Treatment (ha)
2001-02	Treatment	59,084
2002-03	Treatment	77,539
2003-04	Treatment	135,525
2004-05	Surveillance of the core treatment area	26,312
	Treatment of the southwest extension from Greenbank to Yamanto and recent outliers	
2005-06	Surveillance	
2006-07	Surveillance	

Activities are typically conducted in seasons with treatment predominantly performed in summer between September and March with surveillance in winter between April and August. Approximately 377 field staff are employed to perform treatment and surveillance activities.

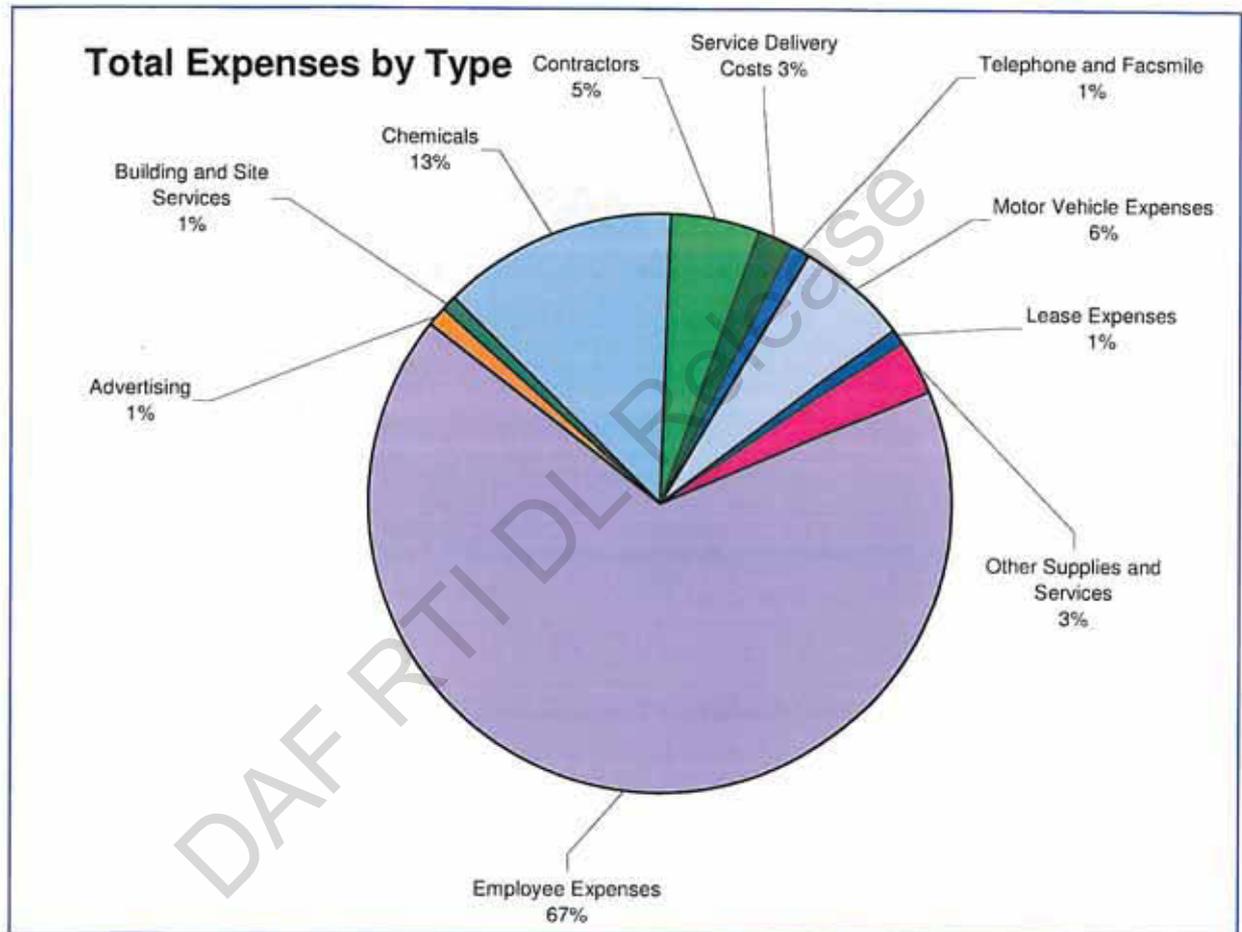
The FAEP is now at a critical phase to identify the last remaining fire ants and retain existing field staff. To combat RIFA, the FACC are involved in:

- treatment
- surveillance
- implementing risk management / movement restrictions
- identification and analysis of RIFA
- conducting research and development for new treatment and surveillance methods
- raising awareness in the general community.

4.2 FACC Expenditure 2004-05

4.2.1 Total Expenses

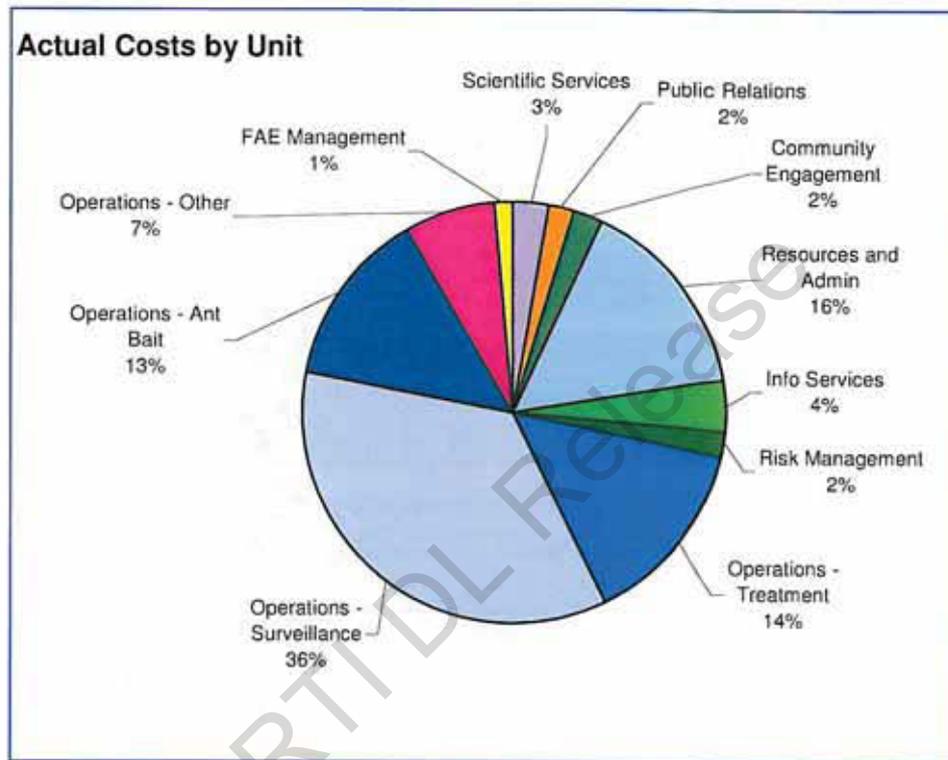
The following pie chart is a breakdown of total expenses incurred in 2004-05 up to 31 March 2005. It clearly highlights the importance of controlling employee expenses.



Based on the 2004-05 Financial Report for the period ending 31 March 2005.

4.2.2 Actual FACC Costs by Unit

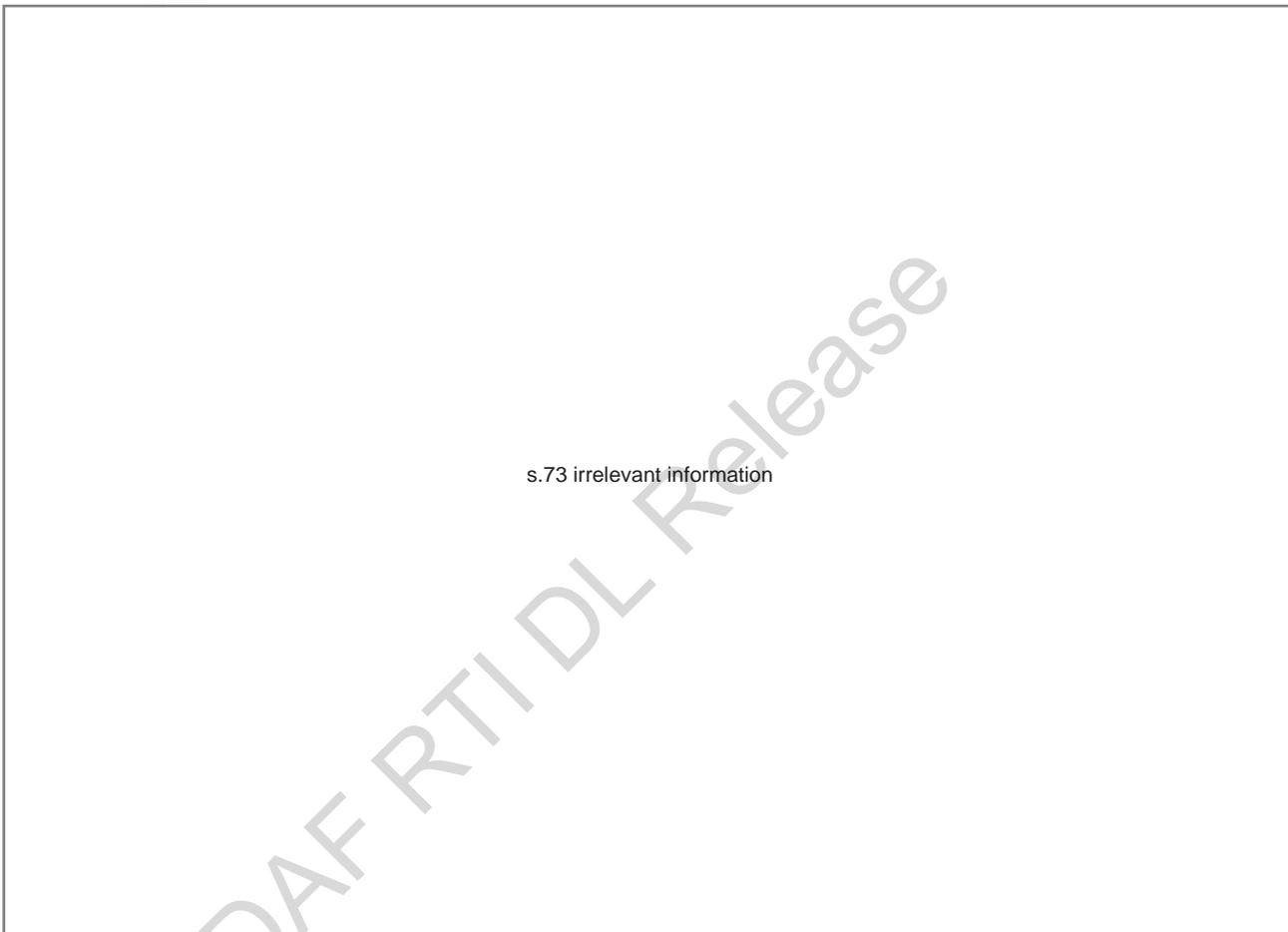
The following pie chart shows a breakdown of costs incurred in 2004-05 up to 31 March 2005 by each FACC Unit.



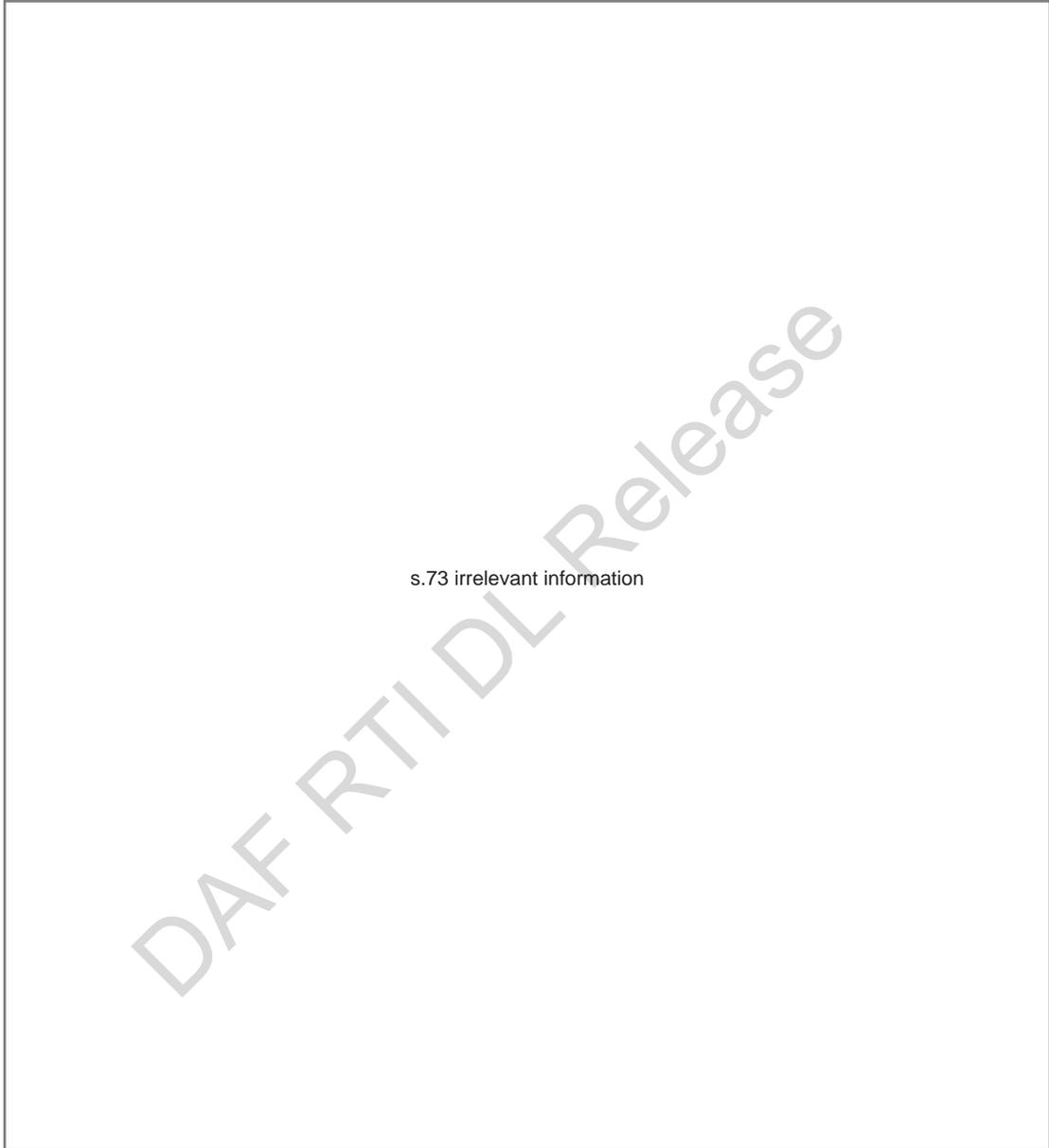
Based on the 2004-05 Financial Report for the period ending 31 March 2005

4.2.3 Actual FACC Labour Costs by Unit

The following bar chart shows a breakdown of labour costs incurred in 2004-05 up to 31 March 2005 by each FACC Unit.



4.2.4 Total FACC Staff Numbers



5 Findings and Recommendations

5.1 Introduction

Detailed below are our findings and recommendations resulting from our review. We have identified opportunities for consideration by FACC that can be realistically implemented before 31 December 2005 and will provide FACC with either direct cost saving or improve the efficiency and effectiveness of business processes.

Careful consideration by management will be required to ensure that any recommendations considered for implementation are thoroughly analysed and the true costs identified. A comprehensive cost benefit analysis should also be performed to assist management in decision making.

5.2 Overview

Our overall finding is that the FACC is achieving the objectives of the FAEP and is operating efficiently. We do, however, note that maximum efficiency is significantly restricted because of the Department of Primary Industries and Fisheries Fire Ant Control Centre Certified Agreement that was entered into with the Australian Workers' Union of Employees, Queensland on 29 August 2003. The agreement remains in force until 30 June 2006.

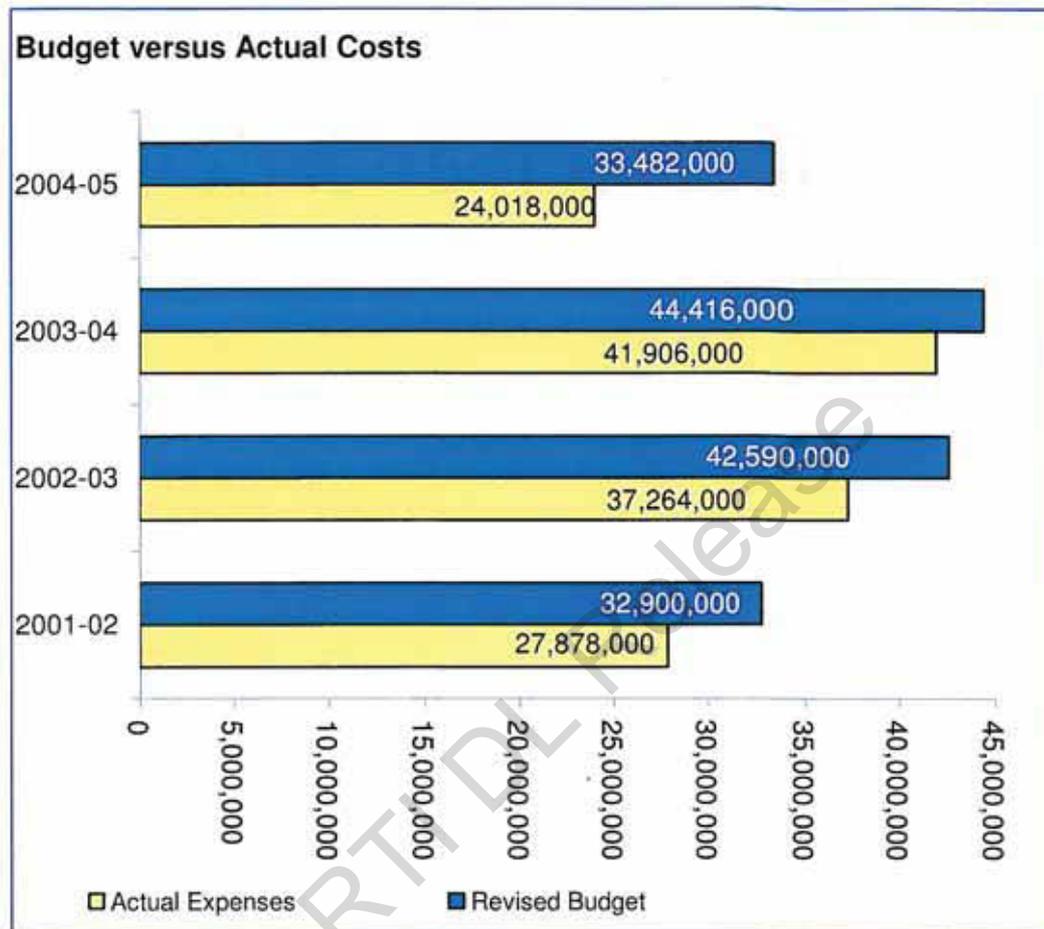
Our finding is demonstrated by the following.

5.2.1 Budget Versus Actual Costs

"The increase of 40,083 ha over the initial 27,807 ha at June 2001 to the 67,890 ha at the beginning of the 2003 treatment season represents an increase of 144%. Through efficiencies and modifications to the Eradication Program, the increased treatment area, surveillance area and other associated activities could be managed with only a 42% increase in the original budget (\$123.4m to \$175.4m)"¹

For each year of the program, there has been a consistent achievement of budgeted costs exceeding actual costs as demonstrated in the following bar chart.

¹ National Fire Ant Eradication Program Progress Report June 2001 – February 2005



Based on the 2004-05 Financial Report for the period ending 31 March 2005.

5.2.2 Bait Costs

The FACC has been able to efficiently manage the cost of bait by contracting a Queensland based company. The savings compared to importing bait from the United States of America are significant as highlighted below in 2003-04.

Financial Year	Bait Applied (tonnes)	Total Cost \$m
2001-02	245	6.4
2002-03	260	7.3
2003-04	459	8.3
2004-05	242	4.45

Beyond 1 July 2005, it is estimated that only 15 tonnes of bait will be required. Because of this, it is envisaged that the bait will be purchased in one transaction and stored.

5.2.3 Treatment Effectiveness

There has been a consistent improvement in the percentage of infested properties that after treatment are considered RIFA free as shown below.

Financial Year	% of Infested Properties RIFA Free
2001-02	75.00
2002-03	97.50
2003-04	99.40

5.2.4 Community Awareness

In a survey conducted in November/December 2004, 99.5% of Brisbane residents had said they had heard of RIFA.

5.3 Field Staff

The existing workforce has proven extremely difficult and costly to manage. This is due to:

- a failure in the initial recruitment process that did not select the most suitable candidates for the job including selection of individuals without necessary background and medical suitability checks. This problem was compounded by the need to bring on a large number of staff in a very short timeframe
- a highly unionised workforce and certain provisions of the Department of Primary Industries and Fisheries Fire Ant Control Centre Certified Agreement
- the de-motivating effects associated with the wind-down of the project and the expiry of the Certified Agreement on 30 June 2006
- the need for intensive and strict human resource management on a daily basis.

While we have noted significant recent improvements in the FACC's management of the industrial relations situation and, as a result, the workforce itself, we note that the following staff efficiency issues still exist:

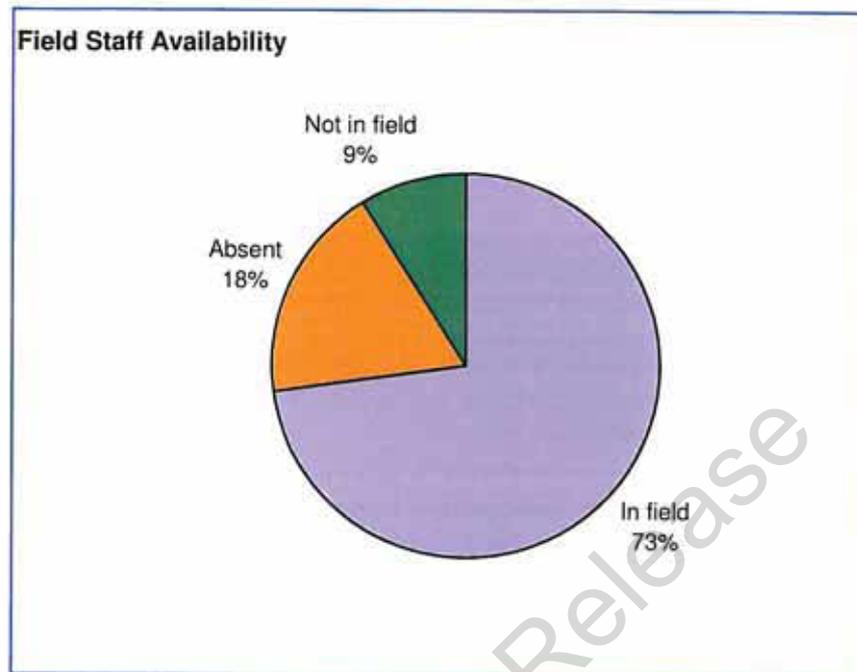
- poor staff availability and attendance
- variable rates of effort across the program
- variable surveillance Quality Assurance results across the program
- high rate of disciplinary incidents.

5.3.1 Field Staff Availability and Attendance

As at 19 April 2005 there were 377 field staff employed to perform surveillance / identification of RIFA and associated eradication treatments. The field staff, who are employed on a 9 day fortnight arrangement, are assigned to one of 30 teams, 5 of which are based at Northgate with the remainder based at Oxley.

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5.3.2 Variable Rates of Effort Across the Program

While an independent empirical study would need to be completed to accurately establish what a 'reasonable' rate of effort is, the available figures and anecdotal evidence suggest that surveillance rates of effort are unacceptably low.

Current surveillance rates of effort do not meet the rates which, at the outset of the program, were considered appropriate. When the program was established it was estimated that a field officer could effectively survey 1.6 ha in a day. The experience of the program to date has indicated that 1.25 ha per officer per day is what can be expected and planned for. Rates of effort, however, are impacted by the requirement to maintain an acceptable level of quality in delivery of services.

The average rate of effort for the previous 12 months (1.25ha) achieves plan. However, this achievement is tempered by the fact that, due to scope changes, the terrain actually surveyed was less problematic than the terrain considered in the original budget. This differential is expected to manifest itself with lower rates of effort results in the next year of surveillance.

Finally, the rates of effort of teams over the previous 12 months and all terrain types show significant variance between teams. Given the nature of the work performed, there appears no reason that, under most circumstances, the higher rates of effort safely and consistently achieved by several teams should not be safely achieved by all teams. However, rates of effort cannot be increased to the point where quality levels are adversely impacted and Quality Assurance standards are threatened or occupational health and safety of staff is put at risk.

5.3.3 Variability of Surveillance Quality Assurance Results Across the Program

The Principal Policy Officer is responsible for managing a Quality Assurance program that monitors the effectiveness of field staff in conducting surveillance and treatment activities.

For treatment, a sticky mat is used that captures bait that has been applied to the area under treatment. A system of artificial RIFA nests is used to monitor surveillance. These are positioned in the field randomly in areas where teams will be working. The team positioning the artificial nests record the unique identifier on each trap and then return to the same location after the surveillance team has completed their work. Quality Assurance statistics are then based on artificial nests set, artificial nests missed and the artificial nests collected by the surveillance team.

We also note that currently the FACC is using artificial nests as it's only Quality Assurance mechanism, although other mechanisms have also been trialled. This means that the results of the Quality Assurance are based on a single method which over time becomes well known by staff and expected. This has the potential to provide a somewhat biased Quality Assurance result over time.

While treatment results have been very good, the latest surveillance Quality Assurance figures suggest that only 62% of the artificial nests are being successfully identified. This drop is partly impacted in the thickness and type of vegetation encountered in year four of the program. When compared to the 82% return rate from prior seasons this is considered unsatisfactory and alarming, especially considering the potential ramifications of surveillance failure in the field.

5.3.4 High Rate of Disciplinary Incidents

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5.3.5 Recommendations

The current Certified Agreement places inherent inefficiencies on the FACC in managing workforce performance.

Monitoring and Enforcement

We note the efforts of management to ensure the field staff's performance of the minimum requirements of their terms of employment are considerable, notably in relation to the morning dispatch of field staff and the implementation of highly effective disciplinary procedures.

Our recommendations for the enhancement of these efforts are detailed in the table below.

Enforcement of minimum requirements
<ul style="list-style-type: none"> The administrative burden on Co-ordinators must be reduced or managed such that they are able to spend at least 50% of their time in the field, inspecting staff.
<ul style="list-style-type: none"> Co-ordinators should conduct random spot checks in the field to ensure that team leaders are not 'signing in' field staff who are absent.
<ul style="list-style-type: none"> Efforts to improve the speed at which teams depart each morning have proved successful. To ensure that these advances have resulted in more time in the field, Co-ordinators should conduct random tests pertaining to field teams' actual arrival at job sites.
<ul style="list-style-type: none"> While there have been successes in ensuring teams have departed in a timely fashion, there appears to be no efforts made to ensure teams are not leaving the field and returning to base significantly earlier than is reasonable. Co-ordinators should conduct unannounced testing of how early teams leave job sites.
<ul style="list-style-type: none"> Field teams should be required to report the intended time and location of their lunch break. As well as improving Occupational Health and Safety standards this allows Co-ordinators to randomly test the amount of time being taken for lunch as well as the appropriateness of the location selected.
Quality Assurance method alternatives
<ul style="list-style-type: none"> The FACC should explore alternative forms of Quality Assurance that provide objective and meaningful analysis of the effectiveness of the surveillance program. The introduction of a different and possibly varied Quality Assurance program over a period of time would help overcome the perceived problems with the existing Quality Assurance methodology that is limited to only one type in the field.
<ul style="list-style-type: none"> The FACC should investigate more objective forms of surveillance that improve effectiveness and efficiency.

Incentives

The existing Certified Agreement and the Industrial Relations situation effectively prevents management taking any form of punitive action in respect of poor output. Most notably the Certified Agreement explicitly prevents the use of Quality Assurance results in performance assessments. Because of this, and in the absence of rewards programs, performance based measures such as rates of effort and Quality Assurance are almost completely ineffective as a management tool.

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As a result, alternative means of aligning the goals of field staff with management objectives must be considered. Motivational options which warrant further consideration are explained in the table below.

Incentives
<ul style="list-style-type: none"> As the program nears completion staff will be increasingly de-motivated due to repetition of work and uncertainty of future employment. The FACC may offer to provide certified training to those staff that are still employed at the cessation of the program and have met set criteria such as Quality Assurance, rates of effort, disciplinary records and who maintain positive sick leave balances. <p>This option creates an incentive for staff to remain until the end of the project, improves future employment prospects through training and provides management with the discretion to apply the rewards based on a performance discretion.</p> <p>Further, as the training would be a clear reflection of the Queensland Government's policies regarding employment and the Smart Queensland program, but is outside the mandate of the FACC, there may be scope for such an incentive to be funded by non FACC funds.</p>
<ul style="list-style-type: none"> Again, as the program nears completion staff motivation will be decreasing due to repetition of work and uncertainty of future employment. The FACC may offer a cash bonuses to those staff that are still employed at the cessation of the program and have met set criteria such as Quality Assurance, rates of effort disciplinary records and who maintain positive sick leave balances. <p>To comply with the Certified Agreement, Quality Assurance results may not be used for performance assessments. For this reason, in order to gain union support, it may be necessary to apply the bonus to all remaining employees and merely grade the value of the bonus on selected performance criteria. In this way, everyone receives a bonus, it is merely the quantum of the bonus which is performance based. As a result, the only practical effect of union objections would be to deny everyone in the work force some level of bonus.</p>
<ul style="list-style-type: none"> It is apparent that well led teams are far out performing poorly led teams. In order to expose as many field staff to good leadership it is proposed that team leaders be rotated through different teams. <p>As the industrial environment requires the employee's consent to change teams it may be necessary to 'incentivise' such a move. For example, team leaders could be rewarded where improved rates of effort and Quality Assurance results are achieved in a new team.</p> <p>Team leaders are best placed to influence the behaviour of the field staff. This approach aligns the interests of team leaders to the goals of more efficient and more effective surveillance/treatment.</p>
<ul style="list-style-type: none"> It is apparent that the monotony of the work is affecting the quality and efficiency of the work being done. To combat this it is recommended that, to the extent that the relevant skills permit, field staff be rotated through different roles and teams such as special surveillance, risk management surveillance, Customer Service Unit and vegetation management teams.

Incentives

- In order to combat absenteeism rates and the 'use it or lose it' mentality which appears to exist in relation to sick leave, the FACC should consider 'paying out' accrued sick leave. To minimise abuse, this payment should only be offered to staff who have served the FACC for more than 12 months and remain employed by the FACC at the cessation of the program or the cessation of their employment contract.

5.4 Outsourcing

5.4.1 Contracted Providers

All surveillance activities are currently undertaken by the 377 field staff. As previously mentioned, a number of issues have been associated with using field staff to perform these tasks. The most significant expenditure item for the FACC is salaries (refer to Section 4.2.1). To reduce FACC expenditure, alternative methods of resourcing surveillance must be examined.

From 1 July 2006, with the expiration of the current Certified Agreement, the FACC will be in a position to engage alternative labour forces to provide surveillance services.

Commonly, outsourcing arrangements provide benefits to organisations by contracting out processes that can be performed more efficiently and cost effectively than if retained in house. The organisation can then devote its energy and focus on strategic management and managing the performance of its contracts.

Provided there are substantial cost savings, and an appropriate accreditation program could be established, the FACC could realistically outsource surveillance activities to councils or to the private sector. By employing a more flexible and responsive workforce, the FACC may achieve efficiencies by identifying RIFA more quickly through employing a larger workforce than is currently possible during the peak surveillance season. Unlike present arrangements, contracted field staff could be employed on a seven day working week basis.

5.4.2 Recommendation

Given the extensive difficulties faced by the FACC in administering and driving the performance of the existing workforce it seems highly likely that efficiencies would be gained by outsourcing surveillance activities to a third party that does not suffer the same restrictions. In order to confirm this, the FACC should undertake a detailed analysis of all costs associated with surveillance activities on a comparative basis, depending on the surveillance location, such as residential lot or per hectare. It will be necessary to identify:

- all direct field staff costs
- all direct equipment costs including vehicles
- overhead costs including operational management, salary processing charges, HR management
- any other indirect costs.

To consider alternative surveillance providers, a market sounding exercise could be conducted with the private sector or councils to gauge their initial interest in providing these services and to obtain likely fee estimations.

The FACC will then need to analyse the costs involved in managing contracts and actively monitoring performance through random field inspections and Quality Assurance audits.

With this information, the FACC will have a comprehensive understanding of what the actual costs of outsourcing surveillance activities will be. Other pricing factors to be considered include paying an increased fee for service for achievement of key performance indicators.

We would also recommend that before embarking on a market sounding exercise, the FACC could conduct a trial for a discrete region, such as for the Rochedale/Burbank area that has been identified recently, to test the viability of contracting out these services. The trial area could also be surveyed afterwards or beforehand by an FACC surveillance team to compare performance between the two groups in terms of time and effectiveness.

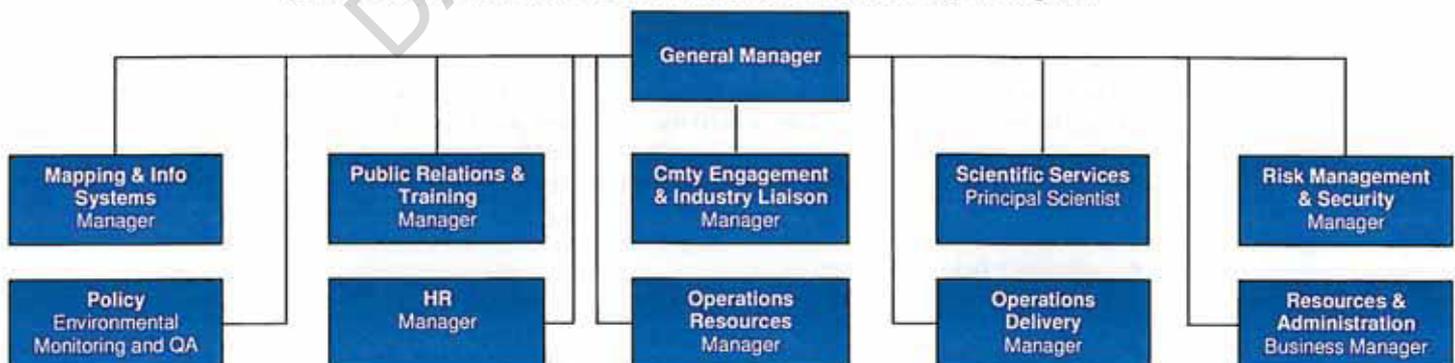
The FACC should consider establishing a certification program for service providers to meet a minimum standard of knowledge, experience and quality in delivery of its services. The program would entail gaining certification to provide services and an annual monitoring program run by the FACC to ensure that certification standards were being maintained by the service providers.

With natural staff attrition in 2005-06, Management should also explore the viability of contracting out limited surveillance services in 2005-06 as an alternative to replacing field staff.

5.5 FACC Organisation Structure

5.5.1 Finding

The current FACC organisation structure was implemented in June 2004 and based on a purchaser provider model. This resulted in splitting Operations Resources and Operations Delivery into two separate units with the managers of both units reporting directly to the General Manager. In effect, Operations Delivery 'purchase' services from Operations Resources who provide field staff to perform treatment and surveillance activities. Similarly, Risk Management & Security 'purchase' services from Operations Resources who provide field staff to monitor implementation of risk management plans.



Based on our observations and discussions with management, the current FACC organisation structure does not appropriately align all FACC functions and tasks. Consequently, the structure generates some inefficiencies and creates conflict between various units. An example of this is the Fire Ant Information System (FAIS). The data entry team in Mapping & Information Systems rely heavily on information provided by Operations Delivery however the Operations Delivery team maintain (refer to Section 5.9.3 for further

information) Excel spreadsheets independent of the FAIS for their information and resource management requirements.

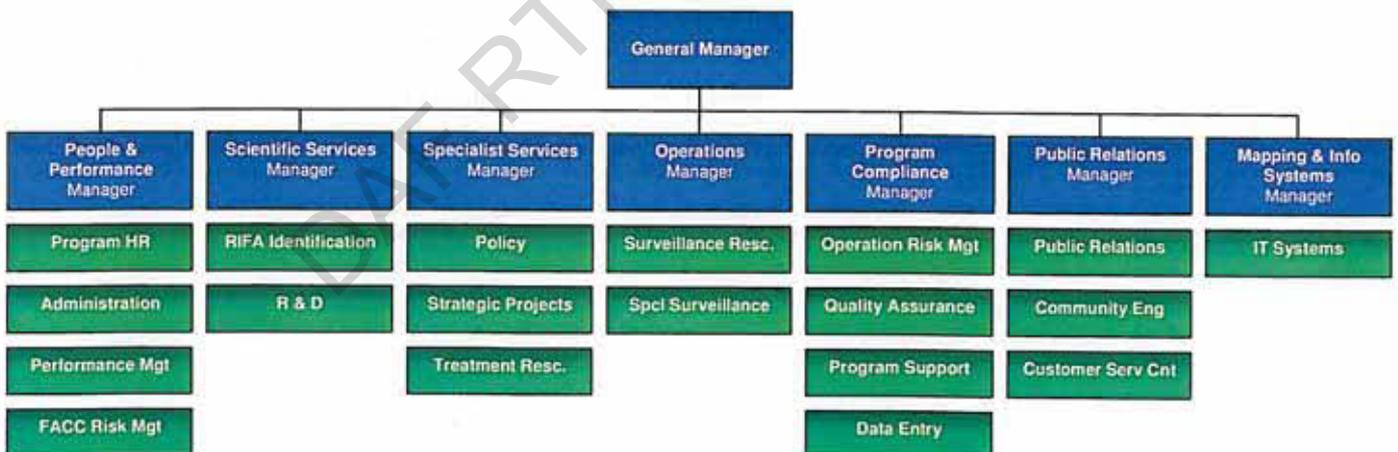
In other cases, Human Resources operate very closely on a daily basis with Operations Resources, however, these two groups are separate entities.

5.5.2 Recommendation

To better align the current FACC organisation structure, we recommend that management implement a revised structure. We propose the solution below that could achieve the following benefits:

- decreases the number of managers directly reporting to the General Manager
- improves efficiencies through reducing management and staff numbers
- aligns functions and tasks more appropriately
- provides greater focus and clarity
- enhances accountability
- drives performance and Quality Assurance throughout the FACC
- future proofs the structure so that major changes or the introduction of new business activities such as contract management can be more easily actioned.

Our proposed organisation structure is shown below. This structure excludes the Management Accountant which is a part-time position attached to the Department of Primary Industry and Fisheries.



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While our proposed structure meets the objectives of the existing purchaser provider model, this should be further reviewed if outsourcing and contracting out of surveillance services occur. A purchase provider arrangement is one in which the purchaser is the agent who

decides what will be produced and the provider is the agent who delivers the agreed outputs or outcomes. Typically, purchasers and providers are separated into two discrete bodies. We recognise that at the FACC there are particular constraints and operational issues that currently prevent a true purchaser model from being fully implemented.

A summary of the key structural changes is provided below while at Appendix A we have provided a detailed breakdown of the actual positions required within each Unit

Unit	Description
People & Performance	<p>This Unit is a merger of the current HR and Resources & Administration Units.</p> <p>New functions to be performed include performance management and risk management which is co-ordinated for the FACC program as a whole (excluding operational risk management which is co-ordinated through Program Compliance).</p>
Scientific Services	Remains as is.
Specialist Services	<p>Policy and strategic project work as required. Quality Assurance is relocated to Program Compliance allowing the unit to focus on its core activities. Treatment Resources will also be managed through Specialist Services.</p>
Operations	<p>Operations is a new unit that combines the surveillance elements of Operations Delivery and Operations Resources. Operations complements the purchaser provider model in place as surveillance activities are delivered to Program Compliance. The six Resource Co-ordinators (reduced from the current two in Operations Resources and seven in Operations Delivery) are brought together under this structure. The existing separation of Delivery and Resources co-ordinators is not warranted due to the successful implementation of HR policies and procedures which did not previously exist when the structure was implemented. This realignment should enhance performance of teams by allowing Co-ordinators to actively manage staff in the field, without jeopardising the Co-ordinator's vital HR function, which is not currently performed satisfactorily. Under an outsourcing model, this unit could be replaced or a combination of outsourced providers and FACC staff may be considered.</p>

<p>Program Compliance</p>	<p>Program Compliance is a merger of Risk Management & Security and Operations Delivery, however, with a greater emphasis on Risk Management, Project Management and the strategic management of the Eradication Program. Therefore the Manager Program Compliance should be experienced in Risk Management (at an enterprise-wise level and program level) and Project Management. Data entry and Quality Assurance are also key functions of this new Unit as it is the purchaser of services and can more effectively monitor and manage performance of its 'contract' with Operations. Moving data entry from Mapping & Information Systems into Program Compliance means that accountability and ownership is with the group that originates the actual data. Program Compliance could also manage contracts if FACC services are delivered by Councils or other service providers in the future.</p>
<p>Public Relations</p>	<p>A merger of the existing Community Engagement & Industry Liaison with Public Relations & Training. The role of Public Relations can be expanded to include the bookings function which is currently part of Delivery. This function could be called Customer Service Centre.</p>
<p>Mapping & Info Systems</p>	<p>Remains as is except for the data entry function which is transferred to Program Compliance. The rationale behind this is that IT can focus on developing and providing support to systems that are required by Program Compliance and People & Performance.</p>

We recommend this new structure be implemented as at 1 July 2005.

5.6 Vehicle Fleet Utilisation



This reduction could be achieved by:



5.7 Motor Vehicle Management

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5.7.2 Recommendation

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5.8 Alternate Data Entry Capture

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5.8.2 Recommendations

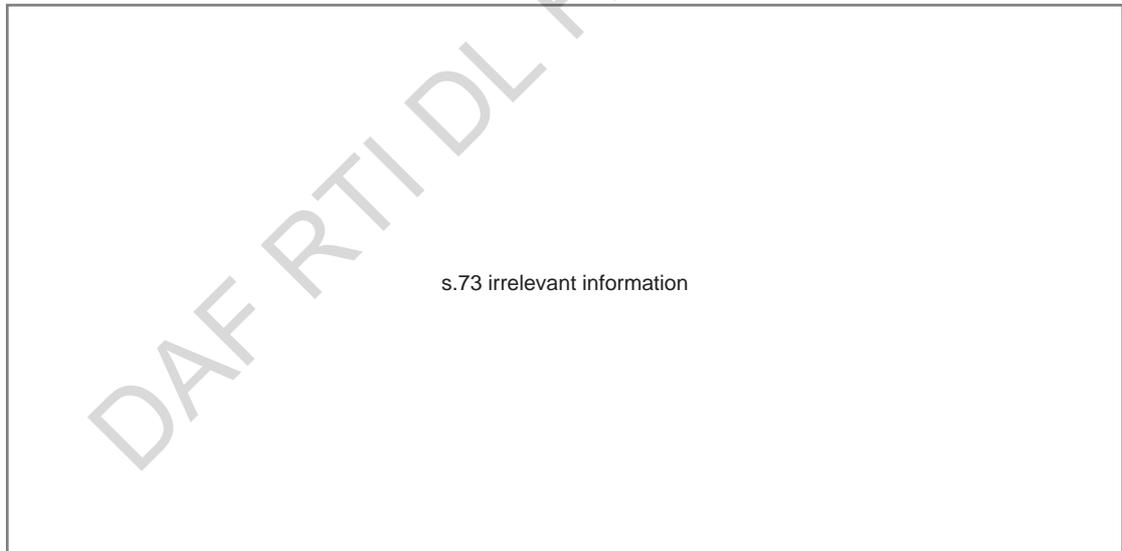
Mapping & Information Systems perform a detailed cost benefit analysis of using alternate data entry capture, such as OCR, to process:

- Return on Surveillance (ROS) forms
- Return on Treatment (ROT) forms
- Quality Assurance forms
- leave forms

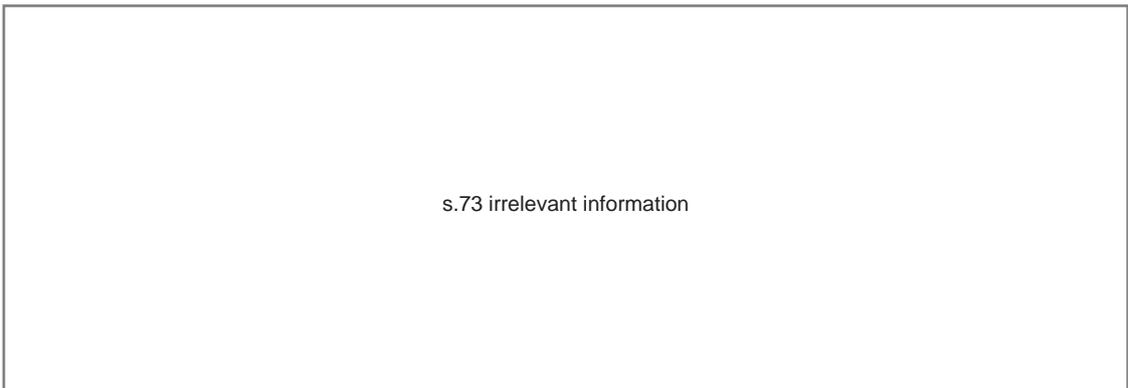
We acknowledge that forms and some business processes may need to be reengineered to accommodate electronic data capture and that many of the forms contain free form text. This may prove difficult when scanning documents for electronic capture.

If alternative data capture is not considered viable, a review of business processes should be conducted to explore options of allowing field staff for instance, to process their own leave forms.

5.9 FAIS - Automatic Job Creation



5.9.2 Recommendation



5.10 Operations Delivery Business Processes

5.10.1 Infrequent Collection of Returns on Surveillance/Treatment

Returns on Surveillance/Treatment forms are not being collected, checked and processed on a daily basis. Instead, these forms are being returned at the completion of each job one to two weeks after they are issued. As these forms are used to inform FAIS as to the status of individual properties the FAIS is constantly up to a fortnight, per team, out of date. With 30 field teams in operation this time lag is considerable and has a material impact on overall FACC operation. This time lag:

- prevents management from drawing timely reports from FAIS
- reduces Operations Delivery's ability to assess which teams are performing
- prevents the Quality Assurance team from accurately assessing the location of field teams in order to set artificial nests 'in advance' of field teams
- delays the bookings team in arranging subsequent visits while the field team is still operating in the district.
- increases the general lack of trust in FAIS integrity, creating greater reliance on independent parallel information systems (see 5.10.3).

5.10.2 Recommendation

ROS and ROT forms must be collected from teams on a daily basis. This obligation needs to be re-emphasised and enforced by delivery co-ordinators. A random sample of ROS and ROT forms should be tested to flag the following dates:

- issuance to field staff
- return from field staff
- Quality Assurance procedures
- data entry into FAIS.

Such testing would indicate whether the forms were being returned daily as well as highlight any bottlenecks which may be occurring in the processing of the forms.

5.10.3 Maintenance of Internal Information Systems Parallel to FAIS

Due to a lack of confidence in the integrity of the FAIS, the Operations Delivery team is maintaining an independent information system, through a series of spreadsheets, for the purposes of reporting and field staff performance management. This has created several inefficiencies, including:

- duplication of effort in respect of the completion and processing of Daily Run Sheets (feeding the Operations Delivery System) and Returns on Surveillance/Treatment (feeding the FAIS)
- inconsistencies between the FAIS and Operations Delivery systems.

5.10.4 Recommendation

It is important that the Operations Delivery team's confidence in the FAIS be restored such that the parallel systems can be abandoned. This would allow a greater focus on maintaining the integrity of one system, reduce the duplication of effort and prevent confusion caused by conflicting data.

In order to restore this confidence it is recommended that a reconciliation of the two parallel systems be undertaken such that the inconsistencies in FAIS can be removed or explained. Once this is achieved the parallel Operations Delivery spreadsheet systems should be abandoned.

5.10.5 Scheduling and Changes in Scope

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5.10.6 Recommendation

The communication of scope changes, typically caused by discoveries of new infestations, has been strictly controlled in order to contain negative political ramifications. While the value in this type of information control is considered justified, we recommend that Operations Delivery, and scheduling in particular, be given greater priority in the release of this information.

Further, while it is recognised that job scheduling must be prepared well in advance (to ensure annual targets can be met), job creation should be strictly limited to three weeks in advance.

5.10.7 Copies of Jobs Provided to Teams

Operations Delivery, in assigning jobs, is providing four copies of the job folder to each team. In effect, this amounts to providing four Return on Surveillance/Treatment forms for each property to be visited. This amount of forms is unnecessary and needlessly increases time and material costs and represents significant paper wastages.

5.10.8 Recommendation

We recommend that no more than two copies of each job folder be provided to field teams. Further copies should only be provided on special request and with reasonable justification.

5.11 FSIS – Field Equipment Allocation

5.11.1 Automatic Assignment of Field Equipment

An array of field equipment, such as mobile phones and vehicles, are used by field staff when performing treatment and surveillance activities. A number of physical controls have been put in place to ensure that this equipment is returned and held securely to prevent theft.

While the Field Staff Information System records assets and equipment at a very high level there is no integration with the job creation process.

5.11.2 Recommendation

Mapping & Information Systems, in conjunction with Operations, should assess the possibility of automating the field equipment allocation process. This would be based on a job creation and taking into consideration the GIS, teams assigned and location, the FSIS could automatically generate an inventory of equipment required, including vehicles, down to the asset number details. This may help expedite the movement of teams out of the Oxley headquarters into the field in a more timely fashion.

5.12 FACC Risk Management

5.12.1 Absence of a Risk Identification and Management Process

Although a risk register is used by the management team to capture key risks across the FACC and identify mitigating strategies, we noted that the register is not being maintained. We would also comment that the register is not a summary of all risks and contains issues rather than a comprehensive analysis of risks to assist management in prioritising and allocating tasks for the remaining critical phase of the Eradication Program.

Key risks currently faced by the FACC include, but are not limited to:

- identification of a new major RIFA infestation
- key resource dependency and succession planning
- retention of field staff and unbudgeted expenditure.

5.12.2 Recommendations

- The FACC should implement a formal risk management process using an appropriate methodology that meets the requirements of AS/NZS 4360:2004 to consistently identify, treat and manage risks across the FACC
- An up-to-date risk register should be maintained at all times. A module within FAIS could be developed for this purpose
- An appropriate resource, such as the Manager Specialist Services, should be made responsible for FACC risk management (excluding operational risk management in Program Compliance) and updating the risk register
- Management should meet on a regular basis to review existing risks and their mitigating treatments as well as identify new risks
- Management should provide ongoing refresher education to relevant staff on effective risk identification.

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5.13 Site Location

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5.13.1 Recommendation

The FACC should investigate alternative premises for the post 30 June 2006 period. Any investigation should consider the possibility of moving the FACC's head quarters and vehicle depot closer to the primary areas of operation, thereby providing efficiencies in terms of treatment resource deployment.

5.14 Alternative Surveillance and Identification

5.14.1 Reward Systems

A bounty system could be implemented whereby the FACC reward the public living in areas that are most likely to be affected by Fire Ants who successfully discover RIFA and then report them to the FACC.

A reward based system is more likely to provide incentives to the public to actively look for RIFA. Although the survey that was conducted in late 2004 indicated that 73.4% of Brisbane residents had checked their yards for RIFA in the previous 12 months, there was only a 32% response rate achieved when 2838 sample kits were sent to residents between July 2002 and June 2003. This slightly improved the following year with a 35.5% return when 3564 sample kits were sent between July 2003 and June 2004.

We appreciate that 'negative' information is required to assist the FACC in identifying RIFA habitats. Therefore, a payment could also be made if negative information was returned to FACC without samples.

Management would need to fully identify all costs associated with a bounty system and put appropriate controls in place to prevent fraudulent behaviour. Certain conditions would also need to be met to receive the cash payment. Careful consideration would need to be given to effectively managing the risks associated with this type of approach including 'salting' of sites, non-reporting of sites by staff in order to gain bounties, etc.

Such a scheme may, however, not work because the reward offered is not considered worthwhile for residents to invest their time.

5.14.2 Efficiencies in Identification Techniques

Based on the observations of the Manager Operations Delivery during his recent official visit to Taiwan, we understand that the Taiwanese Fire Ant Control Centre are in the process of developing a litmus paper test that if successful, would facilitate the identification of RIFA in the field in a quick and cost effective manner. The advantages of this test are significant and could result in major efficiencies by being able to correctly identify RIFA on the spot rather than having to deposit lures, make a return trip to collect the lures and then send them to the laboratory for expert analysis. Untrained staff or members of the public could easily perform the test if it is proven technology. If the latter group were to perform the test, it would be expected that the 2004 survey results, whereby 57.1% members of the public correctly identified the appearance of RIFA, would be significantly improved.

The FACC should continue to monitor closely the developments in this area with a view to exploring the test's application in Australia.

If Scientific Services are able to develop a cost effective trap, or the Taiwanese developed litmus paper test is proven, alternative identification techniques could be employed.

5.14.3 Emerging Technology

It has been suggested that Remote Sensing and other emerging technologies could be applied in the identifying RIFA. The FACC should continue to test the viability and suitability of adopting such technology to improve effectiveness and efficiency.

6 Further Recommendations

The following recommendations are raised for consideration only and in the context of the FAEP approaching closure. It is acknowledged that some of these recommendations can not be implemented until the future of the program is known.

6.1 FAIS

The FAIS is considered a powerful technology tool that has evolved as the FAEP has progressed. The application could be used on other emergency biological pest projects in Queensland and throughout Australia.

The FACC should consider marketing the software for sale in other jurisdictions in Australia to be used for similar projects or overseas for emerging RIFA outbreaks overseas. Revenues from software sales could be used to offset further development costs or could be used to fund further scientific research.

6.2 Electronic Field Capture Units

Presently, the FACC is considered a paper based organisation, despite the FAIS and the FSIS being in place. Post 1 July 2006, it could be reasonably expected that existing surveillance services will be contracted out to Councils or other service providers. If this were to occur, it would be necessary to develop a system for recording data efficiently and cost effectively with respect to services performed by contractors.

One such method would be to use electronic field capture units. In the past, this technology has deliberately not been chosen because of concerns around theft and breakage. If the units were dedicated, one application only type units, rather than using Palm-Pilot style devices, the temptation for theft may be reduced. A cost benefit analysis would need to be performed to determine whether there is an adequate business case for adopting such technology. If, however, the business case is considered viable, a small trial could be conducted using higher performing teams such as the Special Surveillance Team. The system could then be extensively tested so that it is 'ready' to be utilised by contractors.

Appendix A

FACC FTE Breakdown

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Appendix B

Statement of Responsibilities

This report is prepared on the basis of the limitations set out below:

Deloitte Touche Tohmatsu
Enterprise Risk Services

May 2005

Contacts		
Irene Austin	Partner	3308 7209
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This review was undertaken in a manner consistent with Australian Standards for Performance Auditing (AUS 806).

Most evidence in performance reviews of is persuasive rather than conclusive. The work undertaken by us to form assessments involves judgement, in particular regarding the nature, timing and extent of the procedures for gathering evidence and the drawing of conclusions based on the evidence gathered. As a result, our work can only provide reasonable assurance regarding the assessment of appropriateness, effectiveness and efficiency associated with the FACC.

The fieldwork for the review was undertaken in April and May 2005. The matters raised in this report are only those which came to our attention from fieldwork and interviews conducted during that period and are not necessarily a comprehensive statement of all the weaknesses that exist or improvements that might be made. Our comments should be read in the context of the terms of reference of the engagement and the agreed methodology.

We cannot, in practice, examine every activity and procedure, nor can we be a substitute for management's responsibility to maintain adequate controls over all levels of operations and their responsibility to prevent and detect irregularities, including fraud. Accordingly, management should not rely on our report to identify all weaknesses that may exist in the systems and procedures reviewed. Suggestions for improvement should be assessed by management for their full impact before they are implemented.

This report has been prepared for distribution to FACC only. We disclaim any assumption of responsibility for any reliance on this report to any other person other than BSA, or for any purpose other than that for which it was prepared.

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**Scientific Review of Australian Red Imported Fire Ant (RIFA)
(*Solenopsis invicta*) Eradication Program and
Recommendations**

Scientific Review Team

22 June 2006

Bastiaan M. Drees, Peter Davis, Ross Wylie, and Sanford Porter

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Table of Contents

<u>Terms of Reference for the Scientific Review</u>	3
<u>Executive Summary</u>	4
<u>Progress in Meeting Recommendations of the 2004 Scientific Review</u>	8
<u>General Assessment</u>	9
<u>Future Options</u>	11
<u>Specific Comments and Recommendations</u>	13
<u>Appendix 1: Map of Numbers of Treatments Applied to Areas Deemed Infested with Red Imported Fire Ants (RTSa3_TreatCts2.pdf)</u>	
<u>Appendix 2: SRT Draft Conceptual Decision Tree for Inliers/Outliers</u>	
<u>Appendix 3: Containment Room Upgrade Recommendations</u>	

Terms of Reference for the Scientific Review

- A review of the scientific methodologies underpinning the program, with attention to assumptions and processes used in planning and implementing the end phase of the program;
- An assessment of progress in meeting the recommendations of the 2004 Scientific Review;
- A review of the success of the program to date in the eradication of RIFA following the cessation of treatment in the core treatment area and the south west extension and 1-2 years surveillance post-treatment;
- A review of the planned post-eradication activities with reference to the National Tramp Ant Threat Abatement Plan and including an analysis of ongoing risks and threats;
- In this process, interact with the Operational Review Team to provide a holistic review of FACC's operations and develop appropriate recommendations.

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Executive Summary

The Brisbane Fire Ant Control Centre has successfully eliminated the bulk of the original infestation, but red imported fire ants still remain at sites inside the core area and fire ants have dispersed to sites outside the core area. The elimination of fire ants from almost all of Brisbane has been a vast effort accomplished under very difficult conditions. Last year (2005-2006) in the core treatment area of about 160,000 land parcels, fire ants were only found in 49 properties (~150 colonies), an infestation rate of about 0.03%. Such results would verify that the treatment and validation program, when applied as designed, can potentially achieve eradication. The Fire Ant Control Centre (FACC) should be commended for achieving this level of success. Nevertheless, the continued discovery of both inlying sites and outlying sites poses serious challenges for the eventual ability of this program to achieve eradication. With the data currently available, the Scientific Review Team (SRT) is unable to determine whether the program is in a "mopping up" phase that will end in success or whether surviving colonies are beginning to resurge two years after the end of the core area treatments.

Many of the inlying infestations can be traced to difficulties associated with applying baits by ground in urban areas. Documented problems include: 1) obtaining access to sites, 2) delayed bait registration, 3) human error, 4) ground treatment logistics, 5) too few treatments, 6) temporal spacing of treatments, 7) applicator problems, 8) failure to discover colonies, and 9) drought effects. Some problems were avoidable; others were simply a result of running a project as big and complex as this has been. The outlying infestations are probably a result of both natural mating flights and accidental human transport. The SRT is concerned that both inlying and outlying colonies may be spreading faster than they can be found and that a 2 km treatment buffer plus a 2 km survey buffer may be too small to contain these infestations.

The Red Imported Fire Ant National Consultative Committee needs to consider the following options for eradication. The option with the highest probability of success would be to treat the entire region of the infestation (~150,000 ha) by air. We estimate that 6-9 rounds of treatment over 2-3 years would cost \$70-110 million dollars. The advantage of this option is that there is the highest probability of eliminating all remaining inliers and outliers. The disadvantage is the cost and the requirement for aerial treatments.

The second eradication option would be to only treat the areas suspected of harbouring fire ant colony populations such as the eastern half of the core area and the eastern and south-eastern outliers by air. This is an option because it appears that fire ants have been largely eliminated from the Fisherman's Island area, the western half of the core area, and the south-western extensions. All three areas were mostly treated by air. This option is about 1/3 of the area of the first option so it would have about 1/3 the cost.

The third eradication option is a "mopping up" option that involves finding, surveying and treating the area around inlying and outlying colonies up to 2 km out depending on size and number of colonies. These treatments would be either by air or land depending on the occurrence in urban areas. This option would be assisted by a targeted public reward scheme for discovery of infested properties. The SRT feels that without an overall reward scheme conducted early in the 2006-2007 season the third option becomes a Containment Program option rather than an Eradication Program option. Estimates for the "mopping up" option are about \$15-\$30 million over 5 years. The major advantage of this option is that it does not require aerial treatments and it is less costly. The disadvantage is the serious difficulty in finding all inlying and outlying colonies at extremely low densities before they reach reproductive maturity.

The current program is a mixture of the second and third options with an emphasis on the third option. Operating on the assumption that the infestation is being "mopped up" seems to be the only reasonable assumption at this time to attempt achieving eradication within funding constraints if aerial treatments are not permitted over urban areas.

The "mopping up" option can be considered eradication as long as the number of infested inlying and outlying parcels continues to decrease over time. "Mopping up" changes to "containment" if the numbers of infested parcels continue to increase and/or the area of infestation expands significantly beyond the June 2006, 3km buffer line (see further discussion below).

Substantial commitment is still required if eradication is still the goal. Having spent nearly \$175 million, nobody wants to just walk away from the program, but hard decisions may need to be made soon. The SRT feels that in the next 12-18 months it will begin to become very clear whether the program is headed toward eradication or not.

Finally, two major beneficial impacts need to be acknowledged. First the eradication campaign has already delayed the spread of this insect by 10-12 years. Secondly, it appears that polygyne colonies have been eliminated or greatly reduced, an achievement that would cut the potential impacts of imported fire ants by 50-70%.

In reviewing this program the SRT has formulated the following recommendations:

- **Recommendation 1:** Scientific Services needs to be adequately resourced to complete ongoing tasks, acquire new technology and help secure final reporting on Phase 1 of the Red Imported Fire Ant Eradication Program in Brisbane, Australia.
- **Recommendation 2:** The Scientific Advisory Panel and National Consultative Committee seek funding external to the RIFA eradication program to support a dedicated scientific team to document and capture the scientific studies, data and lessons learned from the program to date.
- **Recommendation 3:** FACC conduct a serious analysis of all 'outlying infestations' found since the beginning of the program to gain an understanding of

their causes to assist in future program decisions and provide the results of this analysis to the Scientific Advisory Panel for assessment.

- **Recommendation 4:** FACC undertake analysis of all properties where surviving RIFA populations have been found following the completion of the treatment schedule for those properties and seek correlation with common factors.
- **Recommendation 5:** FACC assess the potential for a RIFA distribution probability model based on the analysis of all 'outlier' infestations found to date in developing more cost effective response strategies to future RIFA detections.
- **Recommendation 6:** The FAIS should be used as an analytical tool to provide an estimate of the individual and collective effectiveness of the various surveillance methods used by FACC to detect Red Imported Fire Ants. This analysis will include % of detections due to (i) FACC structured surveillance, (ii) other FACC activities and (iii) public reports.
- **Recommendation 7:** FACC attempt to determine the role played by professional pest managers in reporting new detections of RIFA in the program to date and assess whether there is potential for this group to play a greater role in the future.
- **Recommendation 8:** FACC to document the reported change in the status of nests from a mixture of polygyne/monogyne to predominantly monogyne.
- **Recommendation 9:** Full nest analysis of newly found colonies, including colony indexing, brood structure and thorough inspection for presence of alate castes, be undertaken by an appropriately scientifically qualified team from Scientific Services prior to nest injection.
- **Recommendation 10:** Where possible, samples from all new colony detections are collected for genetic analysis to establish possible relationships with other colonies/infestations.
- **Recommendation 11:** Investigate the potential of other direct colony treatments to replace the existing nest injection system as a means of simplifying the operation and diverting resources from treatment to Scientific Services.
- **Recommendation 12:** FACC encourage the manufacturers of indoxacarb bait, spinosad mound drench formulations and other pesticide products deemed useful to the program, to seek registration of these products for the management of RIFA in Australia.
- **Recommendation 13:** Investigate the potential of the 2005 LANDSAT dataset or the changes from 2001 to 2005 LANDSAT datasets to predict the newest RIFA infestations.

- **Recommendation 14:** Aerial application of bait will provide the greatest probability of achieving eradication of RIFA.
- **Recommendation 15:** FACC ensure that all areas requiring treatment receive the full complement.
- **Recommendation 16:** Alter the current protocol for treating newly found active colonies to decrease the time between initial treatment with IGR bait and subsequent treatments to only 24 – 48 hours.
- **Recommendation 17:** FACC consider developing and implementing a new reduced treatment protocol for new finds where scientific assessment indicates that there has not been a risk of release of reproductive alates.
- **Recommendation 18:** FACC consider the possibility of replacing surveillance with treatment under circumstances where it is considered treatment would reduce the risks more than surveillance.
- **Recommendation 19:** FACC implement the proposed Reward Scheme by spring this year to increase the chances of public reporting of RIFA infestations and so validate the performance of the program.
- **Recommendation 20:** Based on analysis of the performance of the generic Reward Scheme, FACC consider using targeted reward schemes around new finds of RIFA activity.
- **Recommendation 21:** FACC establish a Glossary of defined terminology and acronyms used within the program.
- **Recommendation 22:** SAP discuss with FACC the opportunities for establishing an agreed uniform reporting structure for the RIFA Eradication Program.

Progress in Meeting Recommendations of the 2004 Scientific Review

The majority of those recommendations have been adequately addressed and actions implemented. Only those needing comment are mentioned below:

2004 Recommendation 2: *Consideration be given to developing a protocol when substituting surveillance for treatment to include more intensive survey methods than just visual inspection, such as pitfall trapping or use of attractive baits, to improve the chances of detecting RIFA infestations.*

This was supported by both FACC and SAP but FACC advises that it has not been implemented. The SRT still considers this action desirable but not a high priority in the present circumstances.

2004 Recommendation 3: *The search for alternative products and ingredients (e.g. MaxForce protein bait, indoxacarb baits, “organic materials” etc.) should continue with registration of additional products pursued to increase the options available for treatment, especially of difficult situations.*

This was initially not supported by FACC but SAP clarified that the intent was to keep abreast of new, effective products that may be added to the arsenal of weapons against RIFA. FACC now advise that Justice and indoxacarb are currently being pursued, but see SRT comments in respect of 2006 Recommendations 10 and 11.

2004 Recommendation 6: *FACC needs to provide sufficient access of the Scientific Group to un-injected nests to allow for valid assessment of the performance of the standard eradication methods (including bait types and application methods) and to develop improved surveillance techniques such as the use of traps and attractant baits.*

FACC advise that the Science Group has been given access to new sites as they become available. This statement differs somewhat from the information provided to SRT during this current review that Science Group has not been involved in analysis of new nests since October 2005, this function being performed by an injection team and a Senior Manager. SRT strongly supports the involvement of Science Group in ongoing nest analysis – Refer 2006 Recommendation 8.

2004 Recommendation 18: *A core capacity of RIFA expertise must be maintained post-eradication to provide identification, respond to public enquiries, carry out surveillance and conduct awareness programs. A mechanism to fund these activities should be established prior to the completion of the eradication program.*

While this matter is ongoing, SRT nevertheless has concerns about the level of science capacity being proposed by FACC in drafts presented to date of a Post-eradication Plan. SRT's views on the importance of science in the end phases of the eradication program are outlined in the Specific Comments and Recommendations section of this review.

***2004 Recommendation 24:** RIFA Consultative Committee to liaise with Biosecurity Australia to develop specific strategies/protocols to prevent new incursions of RIFA into Australia.*

SRT were advised that communication between these groups is continuing but no evidence of action was provided and there has been little, if any, feedback to other stakeholders such as SAP.

General Assessment

1. Overall, the program has been extremely successful in eradicating the bulk of the infestation present in 2001. After three years of treatment at the end of 2003-2004 there were no known viable colonies on 99.4% of treated properties. Limited data from Fisherman Islands and the South West Extension Treatment Area (SWETA) suggest that aerial treatments are nearly 100% effective.
2. Unfortunately, data also show that there are gaps in treatment that are likely program-limiting as far as obtaining eradication (see **Appendix 1**).
 - Some of these gaps have been recognised by the Fire Ant Control Centre (FACC) and classed as 'index cases' - they include human error (e.g. locked gates), delays in treatment (e.g. because of delays in Australian Pesticides and Veterinary Medicines Authority [APVMA] registration), poor application of bait (e.g. ATV and operator limitations) and failure to successfully detect populations in the untreated buffer area by visual sampling.
 - However, it is very evident that there are a significant number of cases of under-treatment - properties in the Core Treatment Area with only 1-2 treatments in total, many less than optimal and others with several treatments that are inadequate because of the timing, spacing and sequencing of the applications (too soon, too late).
 - A significant number of new finds may be linked to these poor/ineffective treatment regimes or undetected nests.
3. Further, records show that many of the new finds, whether outliers or inliers, are monogyne and contained alates. Plumes of winged male and female reproductive fire ants on nuptial or mating flights from such nests compromise already treated areas and expand the infested zone. Findings suggest that a larger (e.g., 6-10 km) treatment buffer may be necessary to catch most alates.

4. From this it seems likely that we may not be in a 'mopping-up' phase of the program but rather are facing a resurgence of the ant in Brisbane.
5. This comes at a time when the program is downsizing (380 staff down to 140) and when there are questions over the continuance of funding by program partners.
6. Having spent \$175 million already, nobody wants to just walk away from the program, nor does anybody relish the prospect of living with the ant.
7. However, to have any chance of success there needs to be recognition, within and outside the program, of the reality we face at present, that the job is by no means over and that a substantial commitment and additional funding is required if eradication is still the goal. This raises the question of how this message can be explained to the public.
8. There are several reasons why we are in this position. From the outset it was stated that aerial application of bait was likely to be the most effective eradication treatment and experience now shows this. However most of the application in urbanised areas has been from the ground for a variety of reasons (water supplies, perceptions of health risks, 'staining' by the bait). These reasons still apply but again there needs to be recognition that other application methods are likely to be less effective even when rigorously applied. The reality that the ants occupy a 3-dimensional habitat, nesting below and above ground (e.g., possibly in roof gutters, rooftops, tree holes, etc.) has not really been addressed.
9. There has been an underestimation of the adaptability of insects - they are inconvenient organisms to work with. At many crucial stages of the program financial, political and manpower considerations have taken precedence over the biological requirements. Funding on an ant treatment/survey per hectare basis has been reduced over time as the area of infestation has increased. This happens in any eradication program, but compromises in treatment timing and sequencing may have contributed to the present situation. The Habitat Model has been a valuable tool but no environment can be classed "too harsh" for survival of insects.
10. Year-1 surveillance of the Core Treatment Area (CTA) and of SWETA may have provided a false perspective of the success of the program. It has been argued that the treatment could suppress nests/populations for a time but that they could subsequently appear in future surveillance and this seems to be the case at present for the CTA at least. The survival of RIFA at 'ground zero' despite 12+ treatments promotes the thought that this could happen elsewhere in the treatment area. SWETA with its aerial treatment is likely to be more successful but this is still to be proven. The role of drought in suppressing evidence of RIFA is also still to be determined.
11. Outliers are being discovered 3-10 km beyond the original core area. The source of these outliers is likely a mixture of mating flights and a failure of quarantine efforts. This information indicates that the original 2 km treatment buffer plus a 2 km survey buffer may have been too small.
12. Many of the outliers and inliers are being found by the public. Consequently, we feel that it is not possible to find all outliers and inliers by structured survey efforts alone. Thus only repeated treatments are likely to eradicate fire ant

- populations and there may be circumstances where further treatments may be considered in place of surveillance.
13. There has been a considerable amount of data collected on the Fire Ant Information System (FAIS) that has been under-utilised in plotting the progress of the program.
 14. There is an ongoing need to preserve Scientific Services to document and publish the program's ongoing impact (e.g., native ant impact, effectiveness of treatments) and program success/failure.
 15. The ongoing interrogation and verification of the database to determine trends, and analysis of data and in supporting operational deviations with clear scientific logic is essential and this may require commitment of specific staff.
 16. The full regime of treatment needs to be applied to those new finds of RIFA populations where there is risk of spread and shortcomings to the existing treatment regime rectified (all areas to receive their full complement).

BENEFITS TO DATE

17. The results indicate that when treatments are applied correctly, eradication of RIFA can be achieved.
18. The polygyne colonies have been eliminated or greatly reduced which will greatly cut the impact by perhaps as much as 50-70%.
19. We have likely delayed the spread of this insect by about 10 years as a result of the program to date.

Future Options

ERADICATION

Large scale area treatments

1. The option with the highest probability of success is to draw a circle around all of the known infestations to date, with a larger (e.g., 3 to 5 km) buffer, and to start again on a 2-3 year treatment program plus selective verification. Bait treatments should be aerially applied. This option is likely to cost about \$70-110 million (150,000 ha of infestation and buffer, \$66/ha for each aerial treatment, 6-9 rounds of aerial treatment).
2. A second option would be to re-treat the eastern half of the Core Treatment Area and to treat a South East Extension Treatment Area in the same way as the SWETA. This could be done for \$20-50 million over 2-3 years.

Mopping up

3. A third option is to continue as at present, finalising actions on current known infestations, applying treatment and surveillance protocols for any new find, and conducting passive surveillance. Latest evidence on new finds suggests that this will not be a simple task and is likely to cost well in excess of what has been requested from FACC for the next 5 years using the current protocol for inliers and outliers. For it to have any chance of success the proposed Reward Scheme needs to be implemented urgently so the true scale of the task can be gauged.

There needs to be detailed analysis of each new find to determine nest status (genetics, presence of alates, risk status) by biology specialists which will potentially facilitate savings by spot treatment of incipient nests rather than applying the full protocol (see **Appendix 2**). This option is similar to aggressive containment below.

Assessing Feasibility of Achieving Eradication

In the next 12-18 months, it should become clear whether it is possible to achieve eradication by "mopping up" newly discovered inlying and outlying infestations. As long as the number of infested properties is declining each year, progress is being made. However, a switch to Containment (see discussion below) may need to be made if:

- 1) The number of infested properties increases over time. We expect that there may be a bit of an increase due to the implementation of the Rewards Scheme. How much of an increase in separate locations would trigger a transition from eradication to containment is a bit arbitrary, but the SRT felt that in the next year 5 new separate inliers and 5 new separate outliers (all small and incipient) would be a very positive situation, 10 new inliers and 10 new outliers would be a worrisome but perhaps acceptable situation, 20 new inliers and especially 20 new outliers would be very bad, and 40 new inliers and 40 new outliers would signal there was no hope of eradication being achieved.
- 2) Finding additional outliers beyond the June 2006 three-kilometer buffer. Outliers are a very serious concern because these would indicate that the fire ants were escaping containment. The SRT felt that more than 3 to 4 new non-human assisted occurrences beyond this boundary would be serious.
- 3) Discovery of a new major population of fire ants like that found around Rochedale in 2005 occurs in the future that requires resources beyond the existing funding commitment.
- 4) Lack of support for a public Reward Scheme would, in the opinion of the SRT, be a de facto change to Containment (see discussion below) because the FACC would no longer have the human resources to do large area surveillance on their own.
- 5) New or additional funding requested was not sufficient to effectively treat new discoveries of inliers and outliers.

CONTAINMENT

Containment occurs in the absence of a Reward Scheme and level or increasing levels of red imported fire ant infestation (e.g., increasing numbers of IP's over time, area of treatment exceeds available funding and capacity).

Aggressive containment

1. This involves treating the area where the ants are found and surveillance in the immediate vicinity (1km radius in likely habitats), accompanied by passive surveillance and possibly targeted rewards. This differs from mopping up in

that the areas treated would be much smaller – essentially a search and destroy operation.

Quarantine containment

2. Designed to restrict the flow of potentially infested items out of the quarantine area. It involves compliance agreements, education and inspection. Chemical control efforts would generally not be a part of this option.

NO ACTION

The ant will spread unrestricted throughout Australia.

Specific Comments and Recommendations

SCIENTIFIC SERVICES

Current tasks assigned to Scientific Services include maintenance of colonies for purposes of training the fire ant detecting dog and training field staff to identify this exotic ant species. A visit to the quarantine facility resulted in suggestions for improving security of ants in culture by suggesting three levels of containment (currently there are only two) – see **Appendix 3**.

In addition, Scientific Services provides the taxonomic support for identification services underpinning the surveillance aspects of the program, facilitates the analysis of the genetic form (monogyne, polygyne) of newly-found fire ant colonies and processes pit fall traps and food lure samples - although the high volume of samples is acknowledged to be difficult for the remaining three-member staff to process in a timely manner. Should a Reward Scheme be implemented sample numbers for processing are likely to increase and the SRT are concerned that Scientific Services may not have sufficient capacity.

As the program reaches the final stages of Phase 1 (2001-2006), much work remains and Scientific Services should serve as playing a critical role in several aspects of the program including the full nest analysis of newly-found colonies (see Recommendation 8), investigation of alternative direct colony treatments (see Recommendation 10), completion of data analysis and documentation relating to program impact and result (see Recommendation 2) and development of research priorities in the final stages of the program.

Recommendation 1: Scientific Services needs to be adequately resourced to complete ongoing tasks, acquire new technology and help secure final reporting on Phase 1 of the Red Imported Fire Ant Eradication Program in Brisbane, Australia.

It is quite obvious that the current limited resourcing of the Scientific Services Section and the reduction in funds available to the eradication program overall makes it increasingly unlikely that the scientific studies, collation and interpretation of data and documentation of the underlying scientific lessons learned from the program to date will

be adequately captured despite the valiant efforts and dedication of the existing Scientific Services personnel. This is considered unacceptable given the size of the investment in the program. It is important for the science to be documented, not only for the use of the current program, but to act as a base for responses to future tramp ant incursions and even generally to incursions of other exotic insect pests.

The SRT believe there is little opportunity to accomplish this within the current program activities, budget and with existing personnel. Consideration needs to be given to sourcing funds external to the program to support a dedicated, suitably qualified scientist for a 6 – 9 month period to document the science behind the program to date. This process needs to be a co-operative one in which other interested scientists also contribute and co-author the report to ensure a balanced approach is achieved. The current RIFA Scientific Advisory Panel (SAP) should progress this approach, choose the participating scientists and provide guidance to the process. FACC will need to provide this team full access to the FAIS and any other data held which is considered important to document/interpret.

Recommendation 2: The Scientific Advisory Panel and National Consultative Committee seek funding external to the RIFA eradication program to support a dedicated scientific team to document and capture the scientific studies, data and lessons learned from the program to date.

Fire Ant Information System (FAIS)

There is significant opportunity to gain greater insight into the progress of the Red Imported Fire Ant Eradication Program through critical analysis of the data currently available and held on FAIS. For example, analysis should provide definitive results for:

- Overall progress of the program towards biological eradication of Red Imported Fire Ant via the Numbers of IP's vs Time (actual, new and cumulative), Numbers of Outliers vs Time and Numbers of Inliers vs Time, total Area treated (actual, new and cumulative) and Area deemed infested (\equiv area treated) vs Time (actual, cumulative)
- Risk posed by detected infestations via nest analysis (available as individual reports) which include detailed analysis as per Macom and Porter (1996).
- Regression analysis of treatment to validate survey finds
- Analysis of eradication success with two years treatment (3-4 bait treatments/year) versus 3, followed by 2 years in which validation surveys are conducted
- Document discovery, response and impact of IP's at Rochedale
- Percent efficacy of nest injection for both the previous chlorpyrifos and the newer fipronil-based systems which would highlight any further needs for development of this method

A serious analysis of all 'outlier' infestations, found since the start of the program, is required to provide an understanding of the reasons for their existence. Throughout the history of the program there have been considerable numbers (≥ 60) of infestations

detected outside the boundaries of the Core Treatment Area (CTA). While each case has been reported and causes postulated for the occurrence of the infestations at those sites, there has not been an overall analysis undertaken of these situations 'as a whole'. Most of the infestations have been found associated with recent building activity and human-assisted movement of RIFA has been postulated for many of the infestations. However, studies indicate that there is little success in shifting functioning monogyne colonies and most of the 'outliers' have been determined to be monogyne. Even where human-assisted transport of colonies is considered the most likely explanation, the SRT are aware of only one case where the source has been found. Therefore, the source of the 'outliers' can be distilled down to either of two possibilities. The source is either:

- (i) flights of monogyne queen ants or
- (ii) human assisted transport from an unknown infestation/s and/or a failure of FACC movement controls

With some 'outliers' being considerable distances ($\geq 6\text{km}$) from known infested properties it is essential to gain an understanding of their causes. If flight of alates is found to be the predominant and most probable cause of 'outliers', the adequacy of the treatment and surveillance boundaries may require review.

Recommendation 3: FACC conduct a serious analysis of all 'outlying infestations' found since the beginning of the program to gain an understanding of their causes to assist in future program decisions and provide the results of this analysis to the Scientific Advisory Panel for assessment.

FACC has detected 97 properties within the Core Treatment Area (CTA) since these properties have received their last scheduled treatment. Of these, 49 have been found since July 2005 which may indicate that suppressed colonies are recovering and becoming more noticeable or that the area has become re-infested by fly-ins from surrounding areas. These incidents need to be fully analysed to gain insight into the true causes of these surviving populations so that any future programs can be modified to reduce the occurrence of surviving RIFA populations following the completion of the treatment schedules. The analysis should include, but not be limited to:

- Numbers of treatments applied to the infested property/parcel (**Appendix 1**)
- Timing of treatments
- Inter-treatment periods
- Types of treatments
- Treatments per season
- Obvious reasons for survival – eg human error, areas missing treatment altogether
- Weather conditions at time of treatment

Recommendation 4: FACC undertake analysis of all properties where surviving RIFA populations have been found following the completion of the treatment schedule for those properties and seek correlation with common factors.

Past surveillance data of 'outlier' infestations may be useful in determining the probability of other nests existing in the surrounding area. This accumulated data in relation to the numbers and distribution of colonies and infested properties associated with all the 'outlier' infestations detected since the start of the program may be useful in developing a probability model of colony distribution about newly detected infestations of RIFA. This may have potential in developing new, more cost-effective response strategies to future detections of 'outliers' (and possibly 'inliers'). This may be more useful when correlated with the associated nest analyses for these sites.

Recommendation 5: FACC assess the potential for a RIFA distribution probability model based on the analysis of all 'outlier' infestations found to date in developing more cost effective response strategies to future RIFA detections.

A critical component of this eradication program (and all others) is the effectiveness of detection of existing infestations of the pest targeted for eradication. The Red Imported Fire Ant Eradication Program has utilised dedicated surveillance teams as part of an active structured surveillance effort, pre-disturbance inspections, the reporting of infestations by treatment teams (foot) and a passive surveillance effort supported by an active community engagement program. It is important for the success of the program that the effectiveness of each of these methods is known individually and collectively. FACC have attempted to measure the performance of these methods; especially that of the standard structured surveillance. They have done this via quality assurance (QA) using reporting of small artificial RIFA mounds by surveillance teams which has given measures of 62 – 82% effectiveness and standard surveillance of infested land in Taiwan followed by intensive surveillance has given an estimate of 82 – 84% for surveillance effectiveness. FACC have guessed the effectiveness of treatment teams and the public to be 20% and 30% effective, respectively. The FAIS holds data which may be able to cross-reference and validate the effectiveness of the various surveillance methods. For instance, the finding of RIFA activity by surveillance teams on the second standard surveillance pass provides a measure of the effectiveness of the first surveillance pass. Similarly, reporting of positive fire ant finds by the public in previously surveyed areas can also provide a measure of structured surveillance effectiveness. These data can be further analysed to detect any trends in this reporting such as the incidence of public reports in relation to the time since the structured surveillance event. Conversely, the detection of fire ants on properties by the surveillance teams can provide a measure of the efficacy of public surveillance in those areas. Other activities such as Pre-disturbance surveillance and surveillance targeted following significant rainfall events may also be able to provide measures/validation of the other surveillance methods.

Recommendation 6: The FAIS should be used as an analytical tool to provide an estimate of the individual and collective effectiveness of the various surveillance methods used by FACC to detect red imported fire ant. This analysis will include % of detections due to (i) FACC structured surveillance, (ii) other FACC activities and (iii) public reports.

Professional pest managers/pest control operators (PCO's) have the potential to be a valuable resource in the detection and reporting of suspect RIFA infestations. As part of their work requirement they visit individual house sites and are often required to manage pest ant species. The FAIS may hold data on the part played by PCO's to date in detecting RIFA infestations and analysis may indicate if there is opportunity to expand their role/participation.

Recommendation 7: FACC attempt to determine the role played by professional pest managers in reporting new detections of RIFA in the program to date and assess whether there is potential for this group to play a greater role in the future.

FACC has reported a shift in composition in relation to polygyny/monogyny of current known RIFA nests status to those previously reported. The FAIS needs to be used to document this development as it may have implications to the future program.

Recommendation 8: FACC to document the reported change in the status of nests from a mixture of polygyne/monogyne to predominantly monogyne.

Other Scientific Services

Over the past 6-8 months assessment of newly discovered colonies has been undertaken by the experienced, but not scientifically trained, nest injection team usually supported by observations of the manager of Scientific Services. This function was previously handled by a dedicated experienced team from Scientific Services. It is also probable that nest analysis is considered less important than nest injection with disturbance prior to injection being minimised. However, significant nest disturbance is required to adequately assess the status of the nest in terms of nest indexing, brood structure, queen ovary status, colony form (monogyne or polygyne), and ensuring the absence of an alate caste. This analysis has the potential to save significant amounts of effort and funds if reduced treatment/surveillance protocols can be applied where there is certainty that the nest is truly incipient and of no risk at having spawned other nests prior to discovery.

Recommendation 9: Full nest analysis of newly found colonies, including colony indexing, brood structure and thorough inspection for presence of alate castes, be undertaken by an appropriately scientifically qualified team from Scientific Services prior to nest injection.

At this stage in the program with small numbers of colonies detected, the underlying reason/s for their existence is important to understand. Establishing colony/infested property relationships via genetic analysis is important to this process and the current practice of sample collection and analysis is supported.

Recommendation 10: Where possible, samples from all new colony detections are collected for genetic analysis to establish possible relationships with other colonies/infestations.

FACC offered anecdotal evidence for the effectiveness of the current nest injection system using fipronil in combination with IGR and/or hydramethylnon-based bait treatments. It would be desirable to have this documented and as a comparison to the previous method employing chlorpyrifos. Nest injection has limitations where colonies are located under paving/asphalt/concrete or where there is no obvious mound. There is potential to improve direct colony treatment via the use of other techniques including direct surface and mound treatments with contact toxicants (acephate – Orthene® and spinosad – Conserve®) or baits with new active ingredients such as indoxacarb. These will need to be assessed against data for current techniques. These techniques may be more convenient to apply and may not require the services of a specialist injection team thus allowing funds to be diverted to resourcing Scientific Services.

Recommendation 11: Investigate the potential of other direct colony treatments to replace the existing nest injection system as a means of simplifying the operation and diverting resources from treatment to Scientific Services.

Recommendation 12: FACC encourage the manufacturers of indoxacarb bait, spinosad mound drench formulations and other pesticide products deemed useful to the program, to seek registration of these products for the management of RIFA in Australia.

FACC reported that the Habitat Model with 2001 LANDSAT imagery was a better predictor of fire ant infestations than when 2005 imagery was used. This may indicate a lag effect (time between habitat becoming suitable for fire ants and them actually successfully establishing a colony and developing to a point that the colony is observed and reported) or that the 2001 imagery represented the most relevant data set for the majority of infestations - which existed prior to 2001. Investigations of whether the 2005 dataset or changes from 2001 and 2005 datasets are useful predictors of newer infestations are considered potentially important.

Recommendation 13: Investigate the potential of the 2005 LANDSAT dataset or the changes from 2001 to 2005 LANDSAT datasets to predict the newest RIFA infestations.

OPERATIONS

The SRT reiterates its view that aerial bait application is the recommended application method and that other methods of application are likely to be less effective and reduce the probability of achieving eradication of RIFA. The results of the program to date support this finding. Aerial application provides a much greater level of certainty that all the required area is treated, assures proper timing and sequencing of treatments, and also accounts for RIFA occupying a 3-dimensional habitat.

Recommendation 14: Aerial application of bait will provide the greatest probability of achieving eradication of RIFA.

Maps provided by FACC detailing numbers of treatments applied to certain areas (**Appendix 1:** RTSa3_TreatCts2.pdf) demonstrated that not all areas deemed infested received a full complement of treatments – even when the protocol was reduced to six treatments over two years for the newer areas. It is not surprising that surviving colonies are being detected in these under-treated areas. Where an area is deemed infested eradication can only be achieved when the full complement of treatments is applied to all known infested land parcels so that reinvasion is eliminated. Any infestation left untreated will result in reinvasion of surrounding areas.

Recommendation 15: FACC ensure that all areas requiring treatment receive the full complement.

The current method for dealing with newly found colonies is to treat the immediate area with an IGR bait, leave for 6-7 days and then treat with Amdro bait and then 1 day later assess its status prior to injecting the mound with a fipronil drench. The SRT believes only 24 - 48 hours is required between treatment of the IGR bait and subsequent treatments allowing this process to be significantly shortened (see **Appendix 2**).

Recommendation 16: Alter the current protocol for treating newly found active colonies to decrease the time between initial treatment with IGR bait and subsequent treatments to only 24 – 48 hours.

Standard protocols for dealing with new RIFA finds (both ‘inliers’ and ‘outliers’) involve a full treatment schedule over two years and a further two years of surveillance. The treatment can vary from a radius of 500 metres to 2km about the colony/colonies depending on the perceived risk with corresponding surveillance boundaries of 1 – 2km. This process can be very ‘resource-hungry’ and may not be the most cost-effective approach with the current constraints on funds. Where full scientific analysis of a colony indicates that it is incipient and would not have spawned other colonies, treatment of the colony itself may be considered sufficient without the need for a full treatment program to the surrounding area – see **Appendix 2:** Conceptual Decision Tree. The spatial analysis of ‘outliers’ covered under ‘Scientific Services’ above would assist in developing an appropriate risk-based approach with potential for significant savings.

Recommendation 17: FACC consider developing and implementing a new reduced treatment protocol for new finds where scientific assessment indicates that there has not been a risk of release of reproductive alates.

Structured surveillance is an expensive process whose purpose is to validate past treatments or detect other infestations. It is at best only approximately 80% effective in detecting colonies and, in itself, does not provide actual control of RIFA. It may be possible under some circumstances (difficult to survey areas, where surveillance is purely for validation) to replace structured surveillance with treatment. Treatment has the advantage of being able to eliminate RIFA colonies which may exist and the treatment coverage is likely to be much closer to 100%.

Recommendation 18: FACC consider the possibility of replacing surveillance with treatment under circumstances where it is considered treatment would reduce the risks more than surveillance.

Central to the success of all eradication programs is the ability to detect all infestations of the target pest and the current RIFA program is no exception. Surveillance methods for the detection of RIFA are relatively insensitive and rely to a large extent upon visual surveillance. Total surveillance effort is the sum of all methods used including structured surveillance (estimated at approximately 80% effective), surveillance by treatment teams (est. 20% effective), other FACC activities (not estimated) and public reports (est. 30% effective) but these fall short of providing a 100% detection capability for RIFA. A Reward Scheme has been considered whereby members of the public would receive a reward (the amount of \$500 was proposed) for the reporting of any new active colony of RIFA on previously uninfested properties or those considered free of RIFA. The SRT is fully supportive of this approach viewing it as a valuable validation of the current surveillance approach and also in demonstrating the true effectiveness of the program to date. The SRT view the Reward Scheme as being so important to the future of the eradication program that they consider provision of future funding to the program be dependant on the scheme being implemented. The SRT believe that this scheme should be implemented this spring so that it terminates no later than December after which seasonal high temperatures/low humidities will reduce the chances of RIFA detection.

Recommendation 19: FACC implement the proposed Reward Scheme by spring this year to increase the chances of public reporting of RIFA infestations and so validate the performance of the program.

Where 'outlier' and 'inlier' infestations are detected, there is opportunity to augment structured surveillance with increased public surveillance by Reward Schemes targeting the areas immediately surrounding the new detections. In urban areas this could be achieved by letter drops, outlining the offer, to specific 'risk' areas. This would need to be considered following analysis of the performance of the general Reward Scheme.

Recommendation 20: Based on analysis of the performance of the generic Reward Scheme, FACC consider using targeted reward schemes around new finds of RIFA activity.

REPORTING

The lack of uniform terminology and uniform reporting structures complicated the SRT's review of the RIFA Eradication Program. The program would benefit from a Glossary of terminology whereby terms and acronyms are defined. Previous FACC reports on the progress of the program tend to be targeted to specific requirements and cover varying periods. A uniform, pre-agreed reporting structure with set time intervals and set parameters would assist FACC, SAP and funding partners to track the progress of this large and complicated program.

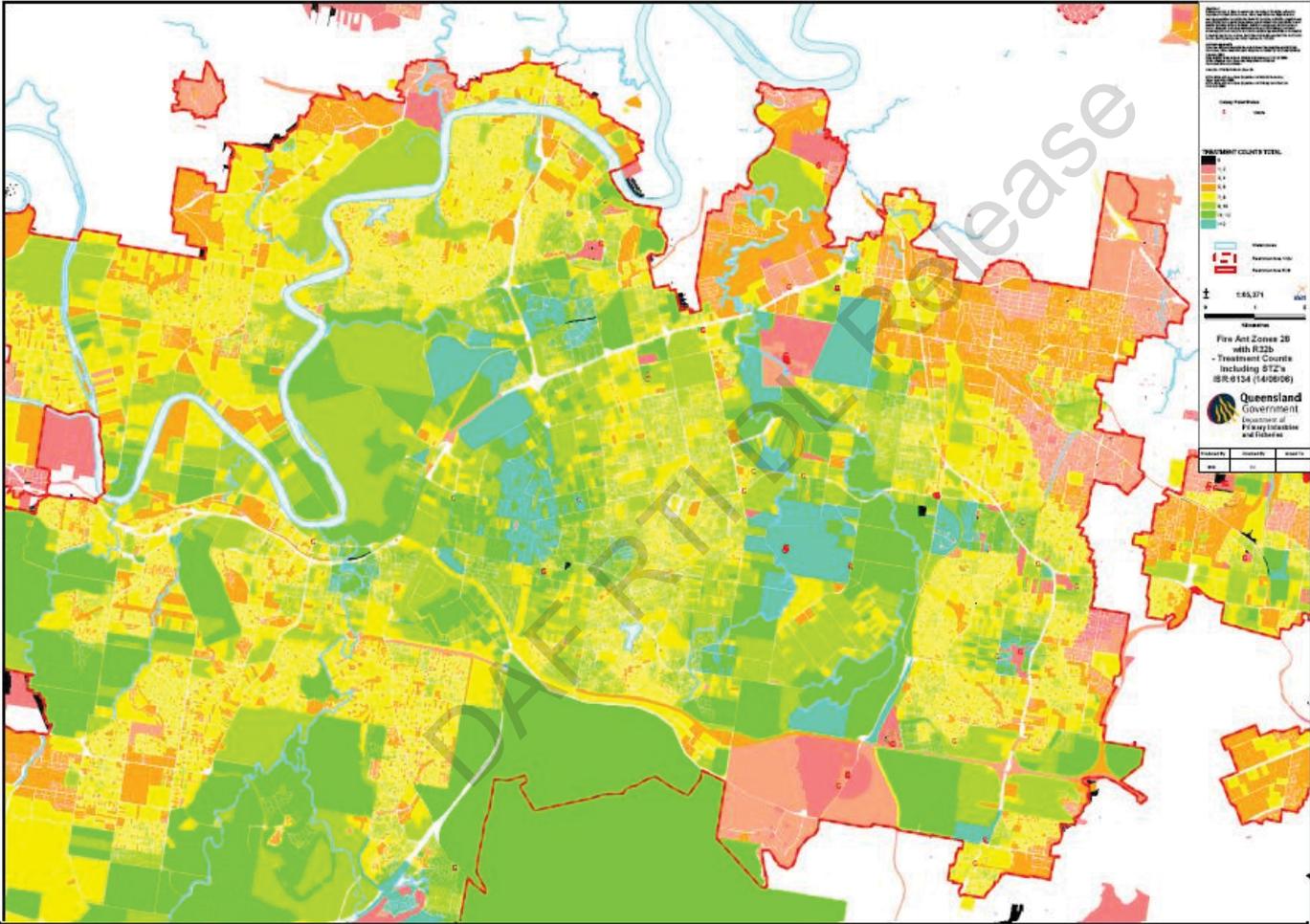
Recommendation 21: FACC establish a Glossary of defined terminology and acronyms used within the program.

Recommendation 22: SAP discuss with FACC the opportunities for establishing an agreed uniform reporting structure for the RIFA Eradication Program.

REFERENCE:

Macom, T.E. and Porter, S.D. (1996). Comparison of polygyne and monogyne red imported fire ant (Hymenoptera: Formicidae) population densities. *Annals of the Entomological Society of America*, Vol. 89, No. 4, pp. 535-543.

Appendix 1. Map of Numbers of Treatments Applied to Areas Deemed Infested with Red Imported Fire Ants (RTSa3_TreatCts2.pdf)



Appendix 2. SRT Draft Conceptual Decision Tree for Inliers/Outliers

1. Find imported fire ant colony.
2. Apply methoprene bait around colony and out to about 20 m. Measure mound dimensions and estimate population from Macom & Porter regression (1996). Look for mating flight exit holes in mound or nearby mound.
3. 12-60 hour later, estimate number of winged male and female ants, reproductive brood (larvae and pupae) and take large sample for genetic analysis in 95% EtOH.
4. Treat with fast-acting mound treatment (fipronil mound injection, hydramethylnon or indoxacarb individual mound treatment with bait, spinosad mound drench or others and broadcast bait about 30 m out).
5. Survey, visually and with food lures, the surrounding 500 meter radius land area thoroughly to delineate infestation/population and optionally broadcast apply an IGR (s-methoprene, pyriproxyfen) bait product

Option 1. If mound is small, immature (small amount of worker brood only) and no mounds are found in scoping survey, no further treatment is required other than a survey out to 200 m in 2-5 months depending on season (2 months summer, 5 months winter). If mounds are found progress to last Option 3 below.

Option 2. If mound is “mature” (large with reproductive brood and alates) and no other mounds are found in the vicinity, treat 500 meter radius area with IGR during or shortly after applying individual mound treatments. Initiate full round (three broadcast bait applications for two years) followed by two full-area surveys with first validation survey initiated at least 6 to 9 months following last IGR bait treatment. (Current treatment protocol)

Option 3. If other mounds are found within the 500 meter radius area, continue surveying outward to 2 km radius or beyond (using habitat model) if necessary when additional fire ant mounds are detected until a 2 km ant-free radius has been established. Sample genetic form, brood status, and alate presence in all mounds found. Treat all mounds present with fast-acting individual mound treatment and broadcast IGR over entire area plus a 2 km buffer beyond the most outer fire ant colony detected. If possible, survey infested parcels 2, 6, and 12 weeks and treat any new mounds detected. Initiate full round (three broadcast bait applications per year for two years) followed by two full-area surveys with first validation survey initiated 6 to 9 months following last IGR bait treatment.

Appendix 3. Containment Room Upgrade Recommendations

1. Triple Containment for all colonies.
 - **level one** is a fluoned tray
 - **level two** is an outer fluoned tray with a liberal sprinkling of talcum powder in the bottom, add wooden bars to prevent inner box touching outer box.
 - **level three** is either the oil cups or a tight screened lid on colony trays. (both would be good)
2. Floor seams and wall seams should be caulked to eliminate wall cracks.
3. There should be a weekly quality control check to report and correct any problems.
4. Apply Teflon barriers up the entire side of containment trays. Be careful of missed corners.
5. Colony dripping should be done by placing bucket with soil inside a large heavily talced tray.
6. Remove *Tetramorium* sp from rearing room. Ants in oil should always be a cause for major concern.
7. Alates very rarely fly in a colony rearing room. However, to be absolutely sure that this is not a problem; remove and kill all winged males and females from lab colonies. Wingless colony queens should not be a problem.
8. Treat with bait around containment building every 2-3 months.
9. Keep door locked.
10. Be sure that nothing touches the colony racks so that the oil cups are not breached.
11. Use gloves when applying or washing off the Teflon.

**Department of Primary
Industries and Fisheries - Fire
Ant Control Centre**

**Follow up of Fire Ant Control Centre
Performance Audit**

September 2006

DAF RTI DL Release

Mr Keith McCubbin
General Manager
Fire Ant Control Centre
PO Box 1241
OXLEY QLD 4075

4 September 2006
Our Ref: 200351

Dear Keith

Re: Final report - Follow up of Fire Ant Control Centre Performance Audit

Please find attached our final report presenting the findings and recommendations of our recently completed follow up of the Fire Ant Control Centre (FACC) performance audit conducted in June 2006.

Please do not hesitate to contact Kym Unwin on 3308 7122 or me on 3308 7209 if you wish to discuss any aspect of our report.

Yours sincerely

sch4-Signature

Irene Austin
Partner

Contents

1	Executive Summary	4
	1.1 Introduction	4
	1.2 Background	4
	1.3 Follow up of prior recommendations	4
	1.4 Key Finding	5
	1.5 Summary of key recommendation	5
	1.6 Conclusion	6
2	Status of prior Fire Ant Control Centre performance audit recommendations	7
3	Detailed Findings	14
	3.1 All Terrain Vehicle (ATV) effectiveness	14
	3.2 Field Coordinators	15
	3.3 Field Staff	16
	3.4 Scientific Services	17
	3.5 Finders Fee	18
	3.6 Fire Ant Bait purchase contract	19
	3.7 Field Staff Training - new nests	20
	Appendix A – Terms of Reference	21
	Scope	21
	Methodology	21
	Deliverables	21
	Appendix B – FACC Personnel Interviewed	22
	Appendix C – Statement of Responsibility	23

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1 Executive Summary

1.1 Introduction

Deloitte Touche Tohmatsu (Deloitte) has undertaken a follow up of the Fire Ant Control Centre (FACC). The purpose of this performance audit was to follow up recommendations identified in the Efficiency Audit completed in August 2005 and to identify any areas where further efficiencies may be achieved.

The engagement was performed in accordance with Australian Auditing Standard AUS 806, Performance Auditing. Further information in relation to the extent of the procedures performed and the scope of our engagement is detailed in Appendix A - Terms of Reference and Appendix C - Statement of Responsibility, respectively.

1.2 Background

The FACC was established to implement the National Fire Ant Eradication Program (FAEP). The aim of the program was to eradicate the Red Imported Fire Ant (RIFA) from Australia through a schedule of baiting for three years that commenced in June 2001 followed by two years of surveillance.

The FACC will reach the conclusion of its original FAEP length during 2006-07. The FACC will operate as a significantly reduced organisation for 2006-07 in accordance with the intended completion phase of the overall program.

The FACC has completed the 2004-05 year with a budget surplus of \$2.7 million.

1.3 Follow up of prior recommendations

As part of our follow up we have identified management actions in relation to the recommendations arising from the prior Efficiency Audit. This has highlighted that the FACC has considered all recommendations and implemented or undertook further analysis of the merits of the recommendation. Details of the status of all prior year recommendations have been outlined in Section 2.

There have been some significant financial efficiency gains noted in some areas. In particular these have been achieved through the reduced vehicle fleet and the reduction in the number of Managers within the FACC management structure.

Two issues identified previously will be raised in this report. These are detailed below:

Issue	Recommendation	Status	Section
Field Coordinators	Coordinators spend 50% of their time in the field	Recommendation implemented and efficiency realised. Further efficiencies could be achieved through greater Coordinator time in the field	3.2

Issue	Recommendation	Status	Section
Finders Fee	A Finders Fee program be considered to assist in the final phase of FAEP	Recommendation unable to be implemented due to policy decisions outside the control of the FACC. This remains a practical method of completing FAEP surveillance objectives.	3.5

1.4 Key Finding

It was evident during our follow up that the FACC has continued its culture of continuous improvement through its commitment to the identification of further opportunities for efficiency. Our assessment of the impact of the prior audit recommendations indicates that FACC continues to operate in an effective and efficient manner in light of the reduced organisation.

Some further opportunities to enhance efficiencies and effectiveness within the FACC have been identified. These are detailed in section 3.

1.5 Summary of key recommendation

Through our follow up of prior recommendations we have identified some additional areas that may further assist the FACC achieve further efficiencies. These have been considered in light of the FAEP reaching the end of its initial program length and the reduced organisation for 2006-07. The table below summarises the key recommendations:

Issue	Key Recommendations	Section
All Terrain Vehicle (ATV) effectiveness	Cost/benefit analysis be undertaken to determine whether ATV's effectiveness in Treatment is considered adequate.	3.1
	Ground Teams to follow the mechanical teams to ensure that inaccessible/difficult areas are treated correctly	3.1
Field Staff	Field Staff to be provided with training in fundamental Fire Ant Q&A to empower them to undertake some of the community relations work	3.3
Scientific Services	Investigate the possibility of utilising a Fire Ant expert to complete remaining Scientific Services work	3.4

Issue	Key Recommendations	Section
Fire Ant Bait purchase contract	Liase with DPI&F procurement to determine whether Fire Ant Bait contract can be renewed in a manner that is most effective for the FAEP and within procurement guidelines	3.5

1.6 Conclusion

Based on the criteria set out in the Terms of Reference in Appendix A, except for the matters noted in section 3 of our report, we conclude the FACC has considered, assessed for viability and, in all material respects, implemented (where it has been deemed appropriate) all recommendations made in the prior Efficiency Audit.

sch4-Signature

Irene Austin
Partner
Enterprise Risk Services
Deloitte Touche Tohmatsu
4 September 2006

2 Status of prior Fire Ant Control Centre performance audit recommendations

As a result of the initial performance audit of FACC completed in August 2005, Deloitte has been engaged to review the status of the recommendations made in relation to the performance audit. As part of our procedures we have validated the current status of the prior review recommendations. The table below highlights the prior finding and recommendation and our findings regarding the progress to date of the recommendation implementation and the impact on the organisation in achieving efficiencies as a result.

Prior Recommendations	FACC Management action	Efficiency gains / impact on FACC	Recommendation Implemented
5.3 Field Staff			
Coordinators to spend 50% of time in field	Coordinators spending 50% of time in field	<p>Increased coordinator's time in the field has led to a reduction in number and severity of disciplinary incidents and improved performance of field staff. It was confirmed with the Program Compliance Manager and Operations Manager that this has resulted in improved output productivity.</p> <p>Greater presence in the field by coordinators has reduced instances of poor conduct by field teams</p> <p>Further, an issue has been raised in section 3.2 as it is believed that greater time spent in the field can achieve further efficiencies.</p>	✓
Random spot checks by Coordinators to ensure field staff are present	Coordinators conducting spot checks to confirm field staff are present and absenteeism is recorded correctly	More staff are available to perform required duties and accordingly an increase in productivity has occurred	✓

Deloitte: Follow up of FACC Performance Audit August 2005

Status of prior Fire Ant Control Centre performance audit recommendations

Prior Recommendations	FACC Management action	Efficiency gains / impact on FACC	Recommendation Implemented
Random tests on field teams' actual arrival at job sites	Coordinators review of actual arrival at job sites	Greater presence in the field by coordinators has improved the punctuality of the field staff and increased the output productivity.	✓
Testing of how early teams leave job sites	Coordinators are reviewing the time teams leave job sites	Greater presence in the field by coordinators has reduced instances of field staff leaving the job site early and increased the output of field staff	✓
Testing of time taken for lunch	Coordinators review of time taken for lunch	Coordinators are monitoring time taken for lunch breaks which has encouraged staff to adhere to assigned break periods	✓
Explore alternatives forms of Quality Assurance that provide objective and meaningful analysis of the effectiveness of the surveillance program	Quality Assurance program improved New artificial nest developed	Improvements to the artificial nests which have made them more realistic and have lead to an increase in the number of artificial nests located during surveillance activities This is demonstrated through the surveillance results below: 2004 – 82% 2005 – 62% 2006 – 75%	✓
Investigate more objective forms of surveillance that improve effectiveness and efficiency	Training a sniffer dog to locate Red Imported Fire Ants (RIFA) Alternative methods to be investigated	Sniffer dog is showing promise in early phases of training however it is still to be determined the future direction of the use of sniffer dogs for the FACC Alternative surveillance methods were investigated however no further advancements have been identified which are viable or cost effective at this stage of the program	✓

Deloitte: Follow up of FACC Performance Audit August 2005

Prior Recommendations	FACC Management action	Efficiency gains / impact on FACC	Recommendation Implemented
Provide certified training to those staff still employed at the cessation of the program	Training grant obtained Staff provided with choice of training courses to attend	Training staff in different skills has improved the morale and engagement of field staff during the reduction of the FACC. A reduction in disciplinary incidents and improved output from the field staff has resulted.	✓
Offer cash bonus to staff still employed at the cessation of the program	Termination payments and pro-rata long service leave secured	Termination and pro-rata long service leave payments have encouraged staff to remain with FACC, during the reduced organisation phase of the program	✓
Team leaders to be rotated through different teams and be rewarded for improved results in a new team	Recommendation not implemented as there is a need to maintain continuity between field staff and team leaders		✗
Field staff be rotated through different roles and teams	Recommendation not implemented as there is a need to maintain continuity amongst field teams. Staff may be rotated where personality conflicts can be addressed in this manner		✗
Paying accrued sick leave to staff of more than 12 months and remained employed at the cessation of the program	Recommendation investigated but not possible to implement as it contravenes Department of Primary Industry policy		✗
5.4 Outsourcing			
Outsourcing surveillance activities to a third party	A cost analysis performed by FACC highlighted that outsourcing was not financially viable		✗

Prior Recommendations	FACC Management action	Efficiency gains / impact on FACC	Recommendation Implemented
5.5 FACC Organisation Structure			
Implement a revised management structure	<p>Merger of public relations and community engagement manager positions.</p> <p>Creation of corporate governance position as part of the People and Performance Manager's roll.</p>	<p>Efficiencies gained through a reduction in the number of Managers have created effective and efficient reporting lines. The corporate governance role has been formalised as part of People and Performance Manager role.</p> <p>Management structure is considered appropriate given the reduced organisation.</p>	✓
5.6 Vehicle Fleet Utilisation			
Vehicle fleet size should be decreased	<p>FACC vehicle fleet reviewed and reduced by 22 vehicles. This consisted of:</p> <ul style="list-style-type: none"> • 6 Dual cab utilities • 1 Hyundai people mover • 15 Nissan pulsars 	An estimated cost savings of \$143,968 was achieved during 2005-06 due to the vehicle fleet reduction.	✓
5.7 Motor Vehicle Management			
Vehicle fleet be managed centrally and through a single data source	<p>FACC vehicle fleet now managed by People & Performance.</p> <p>Fixed bookings for vehicles required by the Operations department for field teams</p> <p>Additional vehicles allocated from FACC Staff Information System (FSIS).</p>	Efficiencies achieved through streamlining the management of the vehicle fleet through a single Department and data point	✓

Prior Recommendations	FACC Management action	Efficiency gains / impact on FACC	Recommendation Implemented
5.8 Alternate Data Entry Capture			
Mapping & Information Systems perform a detailed cost analysis of using alternate data entry capture	A cost benefit analysis was performed and presented to the FAIS Board. The proposition was rejected as insufficient benefit was to be derived at this stage of the program.		x
5.9 FAIS – Automatic Job Creation			
Detailed review of the viability of automatic job creation be undertaken	Further investigation by FACC as to the feasibility showed automatic job creation not a viable option. As an alternative the FACC has implemented the spooling of work maps.	The spooling of work maps has resulted in a reduction of time required to create new jobs	✓
5.10 Operations Delivery Business Processes			
ROS and ROT forms be collected from teams on a daily basis	A key performance indicator has been created as part of the QA checks of field staffs' work activities. The KPI requires field staff to complete RoT & RoS forms ready for system input within 2 days.	From discussions with management we have confirmed that confidence has been restored in the management reporting generated from FAIS. Management reporting relies on the timely input of RoT and RoS forms. For 2005-06, 93.3% of RoT & RoS forms have been entered within 2 days. It is acknowledged that this is slightly below target however this may be a result of forms not being completed accurately and delayed processing of forms from previous years. The FACC have a continual improvement process in place to ensure causes for delays are addressed.	✓

Deloitte: Follow up of FACC Performance Audit August 2005

Prior Recommendations	FACC Management action	Efficiency gains / impact on FACC	Recommendation Implemented
5.11 FSIS – Field Equipment Allocation			
Assess the possibility of automating the field equipment allocation process	FACC Staff Information System (FSIS) completed FSIS now being utilised to track field equipment allocation	Automatic field equipment allocation has provided an appropriate solution to efficiently manage FACC assets	✓
5.12 FACC Risk Management			
Implement a formal risk management process which meets the requirements of AS/NZS 4360:2004	Risk register updated and meets DPI&F departmental standards Risk management awareness training provided to FACC managers Ongoing review of FACC risks and risk management strategies	Formal risk management program in place at the FACC	✓
Maintain an up-to-date risk register at all times	Discussed at monthly manager's meeting and updated as required	Risk register is updated on a regular basis	✓
Appropriate resource should be made responsible for FACC risk management and updating the risk register	Responsibility for FACC risk management has been assigned to Manager, People and Performance	Clear lines of responsibility allow for efficient risk management program	✓
Regular management meetings to review existing risks and their mitigating treatments as well as identify new risks	Monthly manager's meeting used as a forum to identify, discuss and review existing risks and mitigating strategies	Monthly manager's meeting provides forum to discuss risks and mitigation strategies in a timely manner and ensure update the risk register	✓
Provide ongoing refresher education to relevant staff on effective risk identification	Management staff and Team Leaders attended Risk Management training in December 2005	Adequate training in risk management has provided staff with knowledge and skills to manage risk management throughout the FACC	✓

Deloitte: Follow up of FACC Performance Audit August 2005

Prior Recommendations	FACC Management action	Efficiency gains / impact on FACC	Recommendation Implemented
5.13 Site Location			
	s.73 irrelevant information		✓
5.14 Alternative Surveillance and Identification			
Implement a bounty system for public who successfully discover RIFA and then report them to the FACC	A discussion paper has been prepared and is supported by the National Consultative Committee in December 2005 Recommendation not implemented due to operations/policy decisions out of the control of FACC	Refer to section 3.5 where this issue is discussed in detail.	✗
FACC should continue monitor the developments of efficiencies in identification techniques	Currently training a sniffer dog to locate RIFAs Other methods investigated but no improvements at this time	FACC is investigating the potential of utilising a sniffer dog for future activities. The sniffer dog has had positive progress in its early stages of training.	✓
FACC should continue to test the viability and suitability of adopting Remote Sensing and other emerging technologies to improve effectiveness and efficiency.	Other methods investigated but no improvements at this time	FACC has continued to investigate new methods / improvements in technologies. No significant advancements have occurred during this time	✓

Deloitte: Follow up of FACC Performance Audit August 2005

3 Detailed Findings

3.1 All Terrain Vehicle (ATV) effectiveness

3.1.1 Finding

The FACC has utilised All Terrain Vehicles (ATVs) for the application of fire ant bait since the inception of the National RIFA eradication program. This is one of three methods employed by the FACC in its treatment of Fire Ants. The other two methods are aerial application and ground/foot.

The ATVs have been fitted with agricultural spreading machines that have been modified to suit Fire Ant Bait. Spreaders are calibrated to disburse approximately 2kg of Fire Ant Bait per hectare where the ATV speed is 15km/h. Where ATVs encounter rough and uneven terrain it is likely that the bikes move slower than 15km/h and spread an increased amount of Fire Ant Bait over the required level for effective treatment. Where ATVs encounter bumpy terrain it may lead to bait rising from the spreader and either no bait being dispersed or bait being spread in clumps.

Further in areas where the Fire Ant Bait from the ATVs does not reach (e.g. between buildings, garden edges and piping) they would be required to treat this area by foot. There may be occasion where the manual treatment may not be performed on all occasions.

3.1.2 Implication

The use of larger quantities of bait over the budgeted levels leads to greater costs of providing treatment to Fire Ant infestations. Where greater costs are incurred it may impact on the ability of the Fire Ant Control Centre to perform other activities as money needs to be utilised to acquire more bait.

The purpose modified spreaders and the current bait appear to be the most cost effective combination available at this stage of the program. Quality assurance testing has confirmed this to be an effective method of spreading the bait.

3.1.3 Recommendation

A cost benefits analysis to be undertaken to determine whether the increased treatment costs as a result of increased bait usage are greater than the costs to modify or change the bait and/or modify or change the spreader. Potential options may include:

- changing the Fire Ant bait and/or the Fire Ant Spreading device to one that has been specifically constructed for Fire Ant bait
- modify the Fire Ant bait and/or the spreading device to ensure consistent spreading (e.g. including an additive into the bait to make it less clumpy)

Further it is recommended that ground teams be scheduled with the ATV mechanical teams when treating geographical areas. This will improve the completeness of the treatment, as the ground team can distribute bait in the areas inaccessible to the bikes.

3.2 Field Coordinators

s.73 irrelevant information

3.2.2 Implication

s.73 irrelevant information

3.2.3 Recommendation

s.73 irrelevant information

3.3 Field Staff

3.3.1 Finding

The Fire Ant Control Centre (FACC) has secured an externally funded termination and pro-rata long service leave package for current staff of the FACC. These benefits will be paid at the end of the 2005-06 and 2006-07 financial years for all staff that remain with the program until this time and will provide an incentive for the staff to remain and stay engaged until this period.

With the program coming to a conclusion and the organisational structure reducing, maintaining consistent morale and performance from the Field Staff will become more important. As staff are aware of the future of the program and potential for redundancy, maintaining motivation to the end of the program will become increasingly difficult.

In addition the Community Engagement department will also be significantly reduced and will not be able to conduct as much education and community information program to the public.

3.3.2 Implication

If the performance of the Field Staff is not maintained, the program may struggle to achieve the required outcomes if rates of effort are impacted.

There is also a risk that if the profile of FAEP is reduced the community engagement and understanding of the issue may lead to Fire Ant infestations being overlooked and subsequently not reported.

3.3.3 Recommendation

We recommend:

- providing training to field staff in basic Questions and Answers (Q&As) to give them the information to answer questions from the public. Two hour courses and brief updates at fortnightly meetings for new questions and answers.
- assign staff to an area and give ownership of the area to the co-ordinators and field teams.
- provide a feedback system to allow field staff to submit question from the public and provide feedback.

Release

3.4 Scientific Services

3.4.1 Finding

The reduced FACC organisational structure will see the Scientific Services department being reduced to three staff members.

The impact of the reduced workforce will mean that the Scientific Services will not have the ability to complete an environmental impact study or document the scientific knowledge gained from the program.

Further it is acknowledged that the Fire Ant Eradication Program will require ongoing scientific support and the reduction in the Department may not be able to manage additional or unplanned (e.g. where a number of unknown Fire Ant nests may be detected) diagnostic work.

3.4.2 Implication

The scientific knowledge gained in the course of the 5 year program will not be available to assist in the eradication of other infestations in Australia.

The environmental impact study will not be available to funding partners and environmental groups at the conclusion of the program and this may lead to negative responses aimed at the program.

Further diagnostic work is critical to being completed in a timely manner where potential outbreaks have occurred as this will impact on the course of action to be taken in terms of treatment and further surveillance.

3.4.3 Recommendation

Employing or contracting an expert RIFA scientist capable of completing the diagnostic work and writing the environmental impact study and documenting the scientific findings from the Fire Ant Eradication Program from the past 5 years. In addition utilising the expert's knowledge to cross skill the FACC scientific team in areas related to RIFA.

Given the reduced workforce and the potential for unknown or unplanned diagnostic work as a result of new RIFA infestations FACC should determine whether the casual pool of scientific staff would be able to meet the demands of diagnostic work at short notice. Consideration should be given to the possibility of forming a collaborative arrangement with a diagnostic laboratory appropriately skilled in Fire Ants to assist at short notice with any diagnostic work on a long term basis.

3.5 Finders Fee

3.5.1 Finding

As the final phases of the FAEP are approaching it will be imperative for a final effort be put into the identification of Fire Ant nests. This will ensure that an effective treatment and surveillance program can be undertaken where any new incursions are identified. As was identified as a recommendation in the prior report an incentive scheme could be used to encourage the public to participate.

Subsequent to the recommendation being included in the previous report a detailed discussion paper was developed by the FACC and presented to the National Consultative Committee. This was agreed in principle however was stalled due to policy decisions outside of the control of the FACC.

The Finders Fee is an efficient way to undertake 'active' surveillance without the significant costs that would be incurred by FACC to mount a large scale effort by its internal Surveillance Teams. Due to the reduced organisation the FACC would not have the resources to perform this type of work.

3.5.2 Implication

The identification, treatment and surveillance of any new incursions of Fire Ants will be imperative in the FAEP's ability to meet its objectives of eradicating RIFA within Australia.

Further a large scale search/surveillance undertaken in the final phases of the FAEP will ensure that confidence is achieved, through negative confirmations, in relation to the outcome of the program.

3.5.3 Recommendation

We recommend that the FACC continue to pursue the possibility of implementing a finder's fee program to ensure that the FACC can achieve its objectives by offering incentives to the public to ensure 'active' surveillance is undertaken.

3.6 Fire Ant Bait purchase contract

3.6.1 Finding

The existing contract to purchase bait has expired. Due to the quantities of bait purchased, there is a need to secure the current price of \$19 per kilogram. The bait is a Specialised, Australian made bait, purpose made to the requirements of the FAEP. It has been tested and approved for use and proven effective in treatment of the RIFA.

3.6.2 Implication

There is a risk that without a contract the price of the bait used in the FAEP may be subject to unplanned increases. This would significantly impact on the future FACC budget in relation to treatment.

3.6.3 Recommendation

We recommend that the FACC:

- undertake discussions with DPI Procurement Hub on the most effective approach for the FAEP, particularly as it moves into the surveillance phase where demand for bait will diminish over time. A range of factors should be taken into consideration in determining this approach including the specialised nature of the product, the Queensland based supplier, positive supplier relations and an indication by the supplier to continue supply at current cost (i.e. no cost increase), and the infrastructure and supply chain is already fully established
- While acknowledging no procurement policies or procedures should be contravened in any way, *prima facie* it would seem the most efficient approach is to recontract with the existing supplier for a 12 month period to lock in costs

3.7 Field Staff Training - new nests

3.7.1 Finding

As part of the ongoing field staff training, as new Fire Ant nests are located field staff are taken to the site and shown the nest. This assists staff in their ability to identify new nests as well as potential location of nests not previously located. This training is important to ensure the field staff, maintain the ability to identify RIFA nests.

In addition, new nests are photographed and the photos are catalogued for future reference.

3.7.2 Implication

The logistics of transporting all field staff to the location where the new nest is located is difficult and time consuming. This training is also reducing the time available for field staff to perform treatment and surveillance activities.

3.7.3 Recommendation

We recommend the FACC consider a training approach to include viewing the new nest locations on video and shown to staff in the fortnightly staff meeting and make selective nest site visits. This will reduce the time and logistical issues associated with providing the required awareness training.

Appendix A – Terms of Reference

Scope

We understand that the Consultative Committee has requested a follow-up review of the FAEP to obtain an independent examination of the implementation status of the 2005 Audit recommendations accepted by the Consultative Committee. You are also seeking recommendations as to any further efficiencies that may be applied to the proposed reduced organisation in 2006-07. We understand that a separate science review will be conducted in the period 12-23 June 2006 and the follow-up performance review would preferably be conducted in the same time period.

Methodology

Our approach has involved the following steps:

- understood the recommendations agreed for implementation
- conducted an initial meeting of relevant FACC management and key personnel to outline the purpose of this follow-up review, the approach and information required
- conducted interviews with relevant management and key personnel
- reviewed of relevant documentation on the implementation of recommendations and the reduced organisation structure and operations
- identified any issues arising from, or efficiency barriers to, the implementation of the 2005 Audit recommendations and provision of suggestions to overcoming these
- identified of further efficiency gains in either operation, structure or cost management under the 2006-07 reduced organisation
- developed a report including recommendations for discussion with management

Deliverables

The project deliverable is a written report to be delivered to the FACC as a draft by 23 June 2006 and finalised by 30 June 2006 which:

- identifies the status of implementation of 2005 Audit recommendations accepted by the Consultative Committee and any further efficiency barriers, including suggestions to minimise barriers going forward
- in relation to the 2006-07 reduced organisation, clearly identifies and provides recommendations where opportunities exist to:
 - improve the efficiency of business procedures and processes
 - further manage cost efficiencies
 - any further organisational structural improvements may assist in improved operational efficiency
- provides an implementation plan for any recommended improvements.

Deloitte: Follow up of FACC Performance Audit August 2005

Appendix B – FACC Personnel Interviewed

Name	Position
Barry Cooper	Senior Co-ordinator, Operations
Bart Drees	Scientific Review Team
Cara McNicol	Operations Manager
Craig Jennings	Specialist Services Manager
Harry Koch	Business Manager
Jason Haffenden	Program and Compliance Manager
Jenny Bibo	Community Engagement Manager
Keith McCubbin	General Manager, FACC
Mal Spann	Assistant Team Leader, Workshop
Marlene Elson-Harris	Scientific Services Manager
Neil O'Brien	People & Performance Manager
Peter Davis	Scientific Review Team
Ross Wylie	Scientific Review Team
Sanford Porter	Scientific Review Team

Appendix C – Statement of Responsibility

This report has been prepared in accordance with the terms and conditions of contract signed 7 July 2006, with Australian Auditing Standard AUS 806, "Performance Auditing" and subject to the following limitations:

- Our procedures were designed to provide reasonable assurance as defined by AUS 806, which recognises the fact that absolute assurance is rarely attainable due to such factors as the use of judgment in gathering and evaluating evidence and forming conclusions, and the use of selective testing, and because much of the evidence available to the auditor is persuasive rather than conclusive in nature.
- Because of the inherent limitations of any internal control structure, it is possible that errors or irregularities may occur and not be detected. Our procedures were not designed to detect all weaknesses in control procedures as they were not performed continuously throughout the period and the tests performed are on a sample basis.
- Any projection of the evaluation of the control procedures to future periods is subject to the risk that the systems may become inadequate because of changes in conditions, or that the degree of compliance with them may deteriorate.
- The matters raised in this report are only those which came to our attention during the course of performing our procedures and are not necessarily a comprehensive statement of all the weaknesses that exist or improvements that might be made. We cannot, in practice, examine every activity and procedure, nor can we be a substitute for management's responsibility to maintain adequate controls over all levels of operations and their responsibility to prevent and detect irregularities, including fraud. Accordingly, management should not rely on our report to identify all weaknesses that may exist in the systems and procedures under examination, or potential instances of non-compliance that may exist.
- This report has been prepared for distribution to FACC. We disclaim any assumption of responsibility for any reliance on this report to any other persons or users, or for any purpose other than that for which it was prepared.

Suggestions for improvement should be assessed by management for their full commercial impact before they are implemented.

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Scientific Review of the National Red Imported Fire Ant Eradication Program (NRIFAEP)

10 January 2010

Professor Richard Roush, Dean, Melbourne School of Land & Environment, The University of Melbourne, Victoria

Dr Robert Vander Meer, Research Leader-Research Chemist, Imported Fire Ant and Household Insects Research Unit, Center for Medical, Agricultural, and Veterinary Entomology, USDA, Agricultural Research Service, Gainesville, Florida, USA

Mr Peter Davis, Western Australian Department of Agriculture & Food, Perth, Western Australia

Mr Peter Bailey Special Advisor on Biosecurity, Melbourne, Victoria (representing Victoria)

Dr Simon Barry, Program Leader, Environmental Informatics, CSIRO Mathematical & Information Sciences, Computer Science & Information Technology, Canberra, ACT

Professor Tom Kompas, Director, Australian Centre for Biosecurity and Environmental Economics, Crawford School of Economics and Government, The Australian National University, Canberra, ACT (representing the Australian Bureau of Agricultural and Research Economics)

EXECUTIVE SUMMARY

The discovery of the Red Imported Fire Ant (RIFA) in two areas of Brisbane in February 2001 rapidly led to an emergency response that resulted in the implementation of a detailed program intended to eradicate the fire ant (*Solenopsis invicta*) from Australia. A further RIFA incursion, unrelated to the other two incursions, was discovered in Gladstone (Yarwun) in 2006 and the eradication program was expanded to include it.

This review of the National Red Imported Fire Ant Eradication Program (NRIFAEP) was assigned to determine whether the program should continue and, if it is to continue, what form the program should take.

The Review Panel was led by Professor Richard Roush, Dean, Melbourne School of Land & Environment, University of Melbourne. Other members of the Panel were Dr Robert Vander Meer, Agricultural Research Service, USDA, Gainesville, Florida, USA; Mr Peter Davis, Western Australian Department of Agriculture & Food, Perth, WA; Mr Peter Bailey, Special Advisor on Biosecurity, Melbourne, Vic; Dr Simon Barry, CSIRO, Canberra, ACT; and Professor Tom Kompas, The Australian National University, Canberra, ACT.

The Review Panel met by teleconference on 2 occasions and visited Brisbane for on-site inspections and a meeting. A restricted access website was established at Govdex, on which the Biosecurity Queensland staff deposited a wide range of documents, including all three previous scientific and various operational reviews and responses from Queensland Department of Primary Industries & Fisheries. In total, more than 60 documents, including presentations, were made available to the panel before and during the review.

ISSUES

The present review considered the following issues:

- Will the current program eradicate RIFA from south-east Queensland?
- If not, can changes be made to the program to achieve this goal?
- If so, when can they be implemented?
- Is it still cost effective to eradicate RIFA?

COMMENT

A great deal of progress has been made in many areas of the eradication program. The eradication team under its new management shows outstanding commitment and enthusiasm. However, as is often the case even for successful eradication programs, the challenges for this program were more difficult than initially anticipated, especially as the number and distribution of fire ant colonies was discovered to be larger than first believed. On the positive side, fire ants appear to have been successfully eradicated from Gladstone (Yarwun), as has the population initially found in the Brisbane Port area.

Unfortunately, the area of infestation in Brisbane's southwestern suburbs (an area of light industry, some agriculture and natural areas, and a varied pattern of housing) remains problematic. The total restricted area in the program has increased from an initial 28,000 ha in early 2002 to an all-time high of 93,000 ha as additional sites have been found outside the original containment area.

Current surveillance methods are inadequate to define the limits of infestation or to detect new infestations from natural or human assisted spread. In addition, the efficacy of treatment methods is questionable. Thus, the review concluded that RIFA can not be eradicated from Brisbane using current techniques.

Further success and compelling evidence that eradication is technically feasible is limited by the lack of some key research, especially on broad scale detection of infestations by remote sensing (including outside the current restricted area), but also on such issues as the efficacy of current control methods, as evidenced by recurring infestations in key or difficult habitats, e.g. market gardens.

In the report's responses to the Terms of Reference, we offer 10 recommendations with milestones (listed at the end of this report), especially that the fire ant program focus on containment of the current infestation for 18-24 months until key research can be completed to demonstrate successful use of remote sensing, and improved

efficacy of control by pesticide treatments. After that time, another review should be undertaken to determine feasibility of eradication in light of any new advances.

There is in particular a need for improved integration of scientific research, including recruiting additional scientific expertise to the problem, the use of workshops and/or tendering to engage external scientists, and peer reviewed publication. There should be improved validation of the efficacy of current bait protocols under field conditions, including the new bait, Advion (highly effective in the US), under Australian field conditions.

Mathematical models of RIFA spread and eradication need to be improved. The Review Panel also recommends that an updated, definitive and properly peer-reviewed cost-benefit analysis for the control and potential eradication of RIFA be conducted.

Introduction

The discovery of the Red Imported Fire Ant (RIFA) in two areas of Brisbane in February 2001 rapidly led to an emergency response that ultimately resulted in the implementation of a detailed program intended to eradicate the fire ant (*Solenopsis invicta*) from Australia through a schedule of baiting infested areas three to four times a year for three years followed by two years of surveillance. These activities were backed up with quarantine of infested areas using legislated movement controls and by a comprehensive public relations and community engagement program. The Eradication Program continues to be funded through a national cost sharing arrangement involving other states and the Commonwealth.

As is often the case even for successful eradication programs, the challenges were more difficult than initially anticipated. Intensive surveys and passive surveillance found and continues to find colonies outside an expanding restricted area. Thus, the distribution of the fire ant population has not yet been defined.

However, fire ants appear to have been successfully eradicated from two of the three areas in which they have been found, in the Port of Brisbane (Fisherman's Island) area and at Gladstone. At the Port of Brisbane, 12,367 hectares were treated for 130 infested sites with approximately 470 known colonies. The last detection from this original population occurred in 2005. There are now fire ants again in the Port area, but these are believed to have re-infested from the wider-Brisbane region. At Gladstone, 14 known colonies at two infested sites were eliminated, and a total of 1084 ha were treated. The last detection from this population occurred in 2006, and post-treatment site inspections have been completed in this area.

Unfortunately, the third area of infestation, in Brisbane's southwestern suburbs (an area of light industry, some agricultural and natural areas, and a varied pattern of housing) remains problematic. The total restricted area in the program has increased to an all-time high of 93,000 ha as additional sites have been found outside the original containment areas.

This review has been undertaken 7 years after the first scientific review of the

program, which was conducted by Professor Bastiaan “Bart” M. Drees, Director of the Texas Imported Fire Ant Project (Texas A&M University) and Mr Peter R. Davis, Senior Entomologist of the Western Australian Department of Agriculture. They noted that “At this time (September 2002) after one year of treatment and surveillance efforts, the SRT (Science Review Team) is unable to determine whether success will be achieved in carrying out this eradication attempt. We recommend ... continued support for the 2003-2004 season. If, however, by the end of 2004, the ants are not virtually eradicated, the SRT suggests planning now for changing the focus of the program from eradication to containment....”.

Another common theme of previous reviews, as emphasised by the continued expansion of the restricted area, has been the need for alternative fire ant surveillance methods (**Operations Review Of The Red Imported Fire Ant Eradication Program in October 2003** - Recommendation 8, and the **Scientific Review of 2004** - Recommendation 14).

Terms of Reference

This review of the National Red Imported Fire Ant Eradication Program (NRIFAEP) was assigned to determine whether the program should continue and, if it is to continue, what form the program should take.

In particular, the review was to examine the efficiency and effectiveness of the NRIFAEP, with a focus on the following major areas:

1. to identify and, if possible, fill gaps in knowledge and information that will allow an objective determination of the technical feasibility of eradication and in-depth evaluation of alternative management options
2. the long term outlook for the program, including the feasibility of eradication of Red Imported Fire Ants (RIFA)
3. alternative management options for RIFA in Australia
4. analysis of relative merits of alternative management options identified, including how they will impact on the long term goal of the program.

In making recommendations, the review was to:

- examine all previous reviews, reports and plans
- consider relevant scientific knowledge and management experience, both overseas and domestically
- identify gaps in essential knowledge and information that is required to determine technical feasibility of eradication and recommend approaches to fill the identified gaps
- consider the pattern of RIFA spread to date, including through genetic analysis and with reference to management activities

- examine past and present management actions in the response plans, including observing current operations both in the field and off the field
- examine current and proposed technologies and methods and their effectiveness and efficacy in delivering program outcomes
- assess whether RIFA is eradicable in the near or long term future, and advise on the nature of a future program
- identify significant milestones, including critical review points, in a future program, as well as protocols to provide proof of freedom. This should include indicators for the success or failure of eradication outcomes as triggers for considering an alternative approach
- consider the outcomes of the ABARE review of the cost-benefit analysis of the overall program and any major proposed initiatives
- consider the Monash modelling that has been undertaken, or is undertaken on request of this review working group, to indicate the likely impact of the program or initiatives on the spread of RIFA.

Conduct of the Review

The Panel members were notified of their appointments in August and September 2009. The panel was very efficiently supported in the preparation of the review by **Mr Neil O'Brien**, Director, and **Mr Craig Jennings**, Manager, Scientific Services, and their staff, all of the Biosecurity Queensland Control Centre (BQCC) of Queensland Primary Industries & Fisheries.

To organise the review on site and to identify the documents and other materials needed, a teleconference of the panel was held on Friday 18 September, with a second teleconference on 9 October 2009. These teleconferences and subsequent email exchanges organised the review and identified the scientists and other staff to be interviewed.

A restricted access website was established at Govdex, on which the Biosecurity staff deposited a wide range of documents, including all three previous scientific and various operational reviews and responses from Queensland Primary Industries & Fisheries. In total, more than 60 documents, including presentations, were made available to the panel before and during the review.

Bob Vander Meer arrived from the US and began a detailed on-ground review of the fire ant situation, local biology, and operational issues on Monday 19 October, and was joined by Peter Davis on Wednesday 21 October. Rick Roush and Simon Barry joined them on Tuesday 27 October for a field trip and site inspection of the Amberley region southwest of the Brisbane metropolitan area, lead by **Neil O'Brien**, **Craig Jennings** and Ms **Cara McNicol**, Operations Manager.

On Wednesday 28 October 2009, the panel met at the modest facilities of the

Biosecurity Queensland Control Centre at 53 Seventeen Mile Rocks Road, Oxley. While there, the panel heard presentations from and questioned a number of Biosecurity Centre staff and external researchers. About 1.5 hours was devoted to each of the following topics:

NRIFAEP Introduction & Overview, issues and questions, Neil O'Brien, Craig Jennings, Marion Lawie (Manager, Community Engagement), Cara McNicol, and other managers.

Modelling, Dr Danny Spring and Mark Morelande of Monash University, Melbourne, and Associate Professor Oscar Cacho of the University of New England, Armidale.

Cost Benefit Analysis (CBA), George Antony, Innovation Group, DPI&F, Brisbane.

Remote Sensing, Salah Sukeresh at the University of Sydney, with support from Bob Bell of the Biosecurity Queensland Control Centre (BQCC).

Genetics, Jane Oakey and Craig Jennings of the Biosecurity Queensland Control Centre.

Key Assessments of the Review Panel

Collection and Analysis of Data from the Eradication Operations, and Improved Use of Scientific Research

Although there is clearly an increased appreciation of the importance of scientifically designed research in the new management team, the review team was surprised by the lack of a consistent and coherent information base to assess the effectiveness of surveillance and treatment protocols, and shortage of critical research on key technologies. The major information available was the obvious: the applied protocols did not work sufficiently to eradicate RIFA. While this assessment is complicated by the limited execution of protocols due to budget constraints in the previous three years, the benefit of hindsight lets us assess that, since at least 2004/05, the program has not been on a clear trajectory to achieve eradication in the Brisbane area, which highlights the need to develop new approaches.

The NRIFAEP has been generating large amounts of data since its inception in 2001. The Panel would like to stress the importance of critical analysis of this data and timely generation of review documents that can be assessed by external reviewers and if appropriate lead to journal publication. For example:

a) The Gladstone and Port of Brisbane infestations each represent discrete well-defined areas that are now considered fire ant free. The Panel recommends that NRIFAEP, as soon as possible, focus on completing the necessary documentation to declare the Gladstone area fire ant free. This program milestone will generate heightened public awareness and confidence in the program. This part of the project, including the genetic analyses, should lend itself to scientific publication as the first eradication of a major established fire ant infestation in Australia. It is expected that a

fire ant free declaration of the Port of Brisbane will follow, provided the area remains fire ant free. (We note that there were two incursions of fire ants into Melbourne after the Queensland detections, which didn't establish and were successfully eradicated.)

Scientific publication (including the social science of economics) is not just another means of communication among specialists. Being accepted through peer review is the universal standard for quality in research, and also facilitates further input into the program by experts not routinely involved in the program, multiplying the opportunities for progress in developing key technologies.

b) There is a renewed focus on science relative to operations as evidenced by initiatives in genetics, remote sensing and modelling that if vigorously pursued will generate the methods and data necessary to solve problems and determine the feasibility of eradication. In the first 5 years of the program there were over 35 scientific studies initiated, yet there is little or no documentation of the results of these studies. The current science efforts need to be conducted in a way that leads to reports for administrative and external review, and ultimately scientific publication. This will result in increased credibility of this aspect of the Project.

The review team was also surprised by the fragmented nature of the science support provided to the program, which would be the primary route to developing improved protocols that would increase the chances of success. Many of the scientists who are involved are not working on contracted tasks with clear deliverables. In many cases, the full range of scientific expertise available, including externally, had **not** been considered in deciding approaches and work programs.

The review team recommends:

Recommendation #1: The use of workshops and/or tendering in the future to more effectively engage scientists who are strongly committed to the project. Remote sensing research and development, in particular, seems far too ad hoc given its crucial value to the success of the program.

Previous reviews of the National Red Imported Fire Ant Eradication Program (NRIFAEP) have recommended a more analytical approach in assessing the progress of the program and, in particular, that the Fire Ant Information System (FAIS) be used as an analytical tool. The FAIS contains a wealth of information including date of initial detection, how detected (public report or structured surveillance), survey and treatment histories (including details of methods employed), re-infestation incidents and pre-disturbance inspections by Biosecurity Queensland Control Centre (BQCC) staff. A key factor identified in the modelling that might be estimated from these data, based on US experience, would be to obtain estimates of infestation ages before they are controlled, because colony age of about two years or more implies significant production and dispersal of reproductive winged forms (alates).

This wealth of data is still largely untapped as a tool for analysis of the program in developing an understanding of the underlying processes for program successes and failures. Some specific suggestions on analyses, which have potential to be useful in informing program progress, are provided below but are by no means considered exhaustive.

Modelling

Modelling is a key tool that could help assess progress toward eradication, how the efficiency of eradication can be improved, and the costs for varying strategies.

Simulation modelling on its own has little power to infer system behaviour unless the model captures, with sufficient detail, the key phenomena influencing the system. Based on the material provided to the review, we believe that further developments are needed in the modelling framework.

The current model provides a high level tool for considering resource allocation issues in the abstract. For example, it allows consideration of the direction and nature of relationships between program success, treatment and surveillance efficacy. We are not convinced, however, that it allows formal prediction of the probability of eradication from a given management strategy. While uncertainty analysis is incorporated in the assessment, it is not yet sufficient to allow precise inference.

Before undertaking a modelling exercise, it is necessary to characterise the key phenomena that will determine success or failure and consider the spatial and temporal scales over which these phenomena act. From the material presented to the review, it is apparent that the following information is critical:

1. efficacy of the treatment regimes based on rigorous empirical field studies
2. efficacy of surveillance systems based on rigorous empirical field studies
3. patterns of dispersion based on rigorous empirical field studies

It is likely that at least some of the required empirical data could be derived from analysis of the data contained within BQCC's Fire Ant Information System (FAIS). This information needs to be combined with a model with sufficient spatial structure to capture important detail. A clearly calibrated empirically based model will provide a better basis for considering the probability of success of a management strategy.

We note that a model is not an end in itself. In final decision-making, it is critical that all possible ways that an eradication strategy may fail are canvassed and that the model's ability to assess these possibilities is considered. This information should then be incorporated into a final assessment of a strategy for implementation.

The review team came to the following recommendations:

Recommendation #2: Review of the structure and logic of the simulation model against possible mechanisms of failure of the eradication process. Use this to revise the structure of the model.

Recommendation #3: Collect empirical data to better calibrate the simulation model to reflect behaviour of the system (treatment and surveillance efficacy, and dispersion patterns).

Surveillance, Detection, Remote Sensing

Surveillance is a key element in the eradication program. Multiple methods are necessary to cope with the wide range of terrain, special situations, and magnitude of the problem. It is reasonable to conclude that one of the primary causes of failure to eradicate has been the inability to detect incursions effectively, as evidenced by an expanding restricted area.

Surveillance by fire ant odour detecting dogs represents a novel and sensitive method of fire ant colony discovery. Its limitations are that the dogs are expensive to train and maintain, and their daily workload is limited to several hectares. This program should continue for discrete areas that are not amenable or appropriate for surveillance by aerial remote sensing, e.g., post-treatment validation of infested properties, site inspections, and terrain where visual surveillance is limited.

However, the review team believes that it is essential that a surveillance technique be found that can cover significant areas of the management region in a cost effective way. Without this, there is little chance of eradication of the current RIFA infestation.

The only technique presented to the review that has the capacity to do this is aerial remote sensing. The review had mixed views about the possibilities of this approach. It was noted that the results were very preliminary, and it was also found that this was the third time the program had assessed remote sensing without initiating a strong effort forward. Fire ants do offer a unique advantage in detection compared to other invasive species, in that their mounds provide a heat signature during the winter months. There needs to be a clearer strategy and work program to determine if this signature can be fully exploited.

There will be major technical issues calibrating the approach across the large and diverse areas in the management zone. In addition, if the false positive rate cannot be carefully controlled, the utility of the technique will be limited, as it will effectively detect possible nests everywhere and therefore not significantly reduce the size of the surveillance problem.

It will also be important to control the false negative rate, in particular assessing the cross correlation of this over the area. Missing small infestations will be a key cause of failure of the eradication program. Arguments that these missed infestations will eventually be found are predicated on a significant number of assumptions that are untested.

Another area of concern is the potential constraint that the remote sensing technology can only be applied at certain times of the year and over limited areas. In this case, the processes of dispersion and reinfestation could undermine any gains made by this surveillance/treatment methodology.

Overall there are significant challenges to the use of this technology. Still, the remote sensing approach has such a large potential influence on success that the review team recommends that it be rigorously assessed as soon as possible.

Recommendation #4: A workshop be held involving key researchers in remote sensing in Australia to ensure best practice methods are applied and that potential issues are clearly identified.

Passive Surveillance

The NRIFAEP needs to aggressively pursue Community Engagement as a way to maintain or increase passive surveillance activities. Householders that checked their property in the last 12 months have decreased from 73% in 2003 to 52% in 2008.

A key component of Community Engagement is to maintain the currently recognised “brands”. There has been a considerable investment in bringing public attention to the “no fire ant” symbol, and continued use of such items as hats and fridge magnets is critical to the nationally funded effort to suppress and contain RIFA, and thereby maintaining the opportunity for eradication.

Recommendation #5: Continue to emphasise Community Engagement to enhance passive surveillance activities, and maintain the currently recognised “brands”, including the “no fire ant” symbol.

Population Genetics of RIFA Colonies

Great progress has been made on the population genetics of RIFA by the NRIFAEP team, in collaboration with the USDA in Florida. Illustrating the enormous benefits of investment in scientific research and international collaborations, the extensive use of genetic markers now allows an assessment of the number of genetically independent introductions of RIFA (at least 3 and perhaps 6), but more importantly allows estimates of frequencies and dispersal distances of RIFA colonies from source nests, and the inference of undetected nests. In particular, finding a new nest in a previously treated site that is unrelated to previous colonies on the site implies that there is probably another source site close by. This work should be published in appropriate high profile journals at the earliest opportunity. The continuing practical applications include conducting genetic analysis of all samples collected by NRIFAEP to identify fire ant social form by GP9 (monogyny or polygyny) and relatedness through microsatellites.

Habitat Mapping

Although the habitat mapping is highly sophisticated and admirable in focusing attention on high priority areas, it should be considered as probabilistic, not absolute. That is, for example, although we agree that the military reserve and other natural vegetation sites near the restricted areas are unlikely to have many RIFA colonies, the probability is not zero, and members of the review team with US experience consider it likely that some colonies could reside in these poorly RIFA-suitable habitats and act as a source for further infestation.

Estimates of Treatment Strategy Efficacy

Genetic analyses by BQCC of RIFA populations in Queensland indicate that there have been at least three separate incursions of RIFA: (i) a monogyne population whose epicentre is the Brisbane Port area (Fisherman's Island), a western polygyne/monogyne mixture population centred about Wacol and a monogyne population located in Gladstone, sited 500km to the north of Brisbane. The BQCC report that two of these infestations, the Brisbane Port and Gladstone monogyne populations, have been eradicated. The largest, and possibly oldest, infestation centred about Wacol has been substantially reduced but has encountered problems of persistent survivals or re-infestation along with difficulty in delineating the outer limits of the infestation.

Analysing the reasons for the survival of populations of RIFA within areas which have received the full complement of bait treatments is complicated by the use of direct nest treatment (via injection of liquid insecticide under pressure), in addition to the standard broadcast bait treatments used as the mainstay for the program as recommended by the USDA scientists. The 2004 review team identified routine nest injection as a complication in assessing the efficacy of standard bait treatments, because nests were not treated only with baits.

The detection of polygyne colonies within the core treatment area long after the completion of treatments is indicative of treatment failure rather than reinfestation. We conclude this because newly mated polygyne queens cannot establish colonies independently, in contrast to newly mated monogyne queens. Instead, polygyne queens must be adopted into existing polygyne nests. This implication of treatment failure further highlights the need to further experiment upon and evaluate treatment protocols, including in tightly monitored areas where only baits are applied.

Current and Proposed Insecticidal Treatments and their Evaluation

Current fire ant management methods utilize three fire ant bait formulations (active ingredients: methoprene, pyriproxifen, and hydramethylnon). The efficacy of these bait formulations was extrapolated from studies carried out in the United States. However, the distribution of new colony discoveries (monogyne and polygyne) suggests that treatment failure may occur. The Panel recommends that, due to climatic differences and especially differences in the diversity of competitive Australian ant species compared to the ant fauna in the southern United States, the NRIFAEP needs to validate the efficacy of their current bait protocol under field conditions.

The NRIFAEP currently uses an insecticide injection method to eliminate new colony discoveries. The procedure requires several personnel visits: bait treatments, odour detection dogs, and pitfall trap deployment, collection and analyses. It may be possible to achieve the same level of confidence in control with the relatively new fire ant bait, Advion (active ingredient, indoxacarb), which has been demonstrated in the United States to give excellent control within 2-3 days. The Panel recommends that NRIFAEP evaluate the efficacy characteristics of Advion bait under Queensland field conditions. If the results are satisfactory, then NRIFAEP needs to validate, and conduct cost analysis of a revised new colony elimination protocol that replaces

mound injection with Advion bait treatment and after-treatment surveillance with fire ant-sensing dogs.

The BQCC report that there is no mandatory quality testing of fire ant control chemicals currently in place. If products used for the treatment of fire ant infestations do not comply with specifications, this could lead to poor performance and fire ant survival. Without background information on treatment product compliance with specifications, it is not possible to rule out product performance where fire ant survival is detected and hence complicate any analysis of why survival occurred. Poor performance of treatments could be due to concentrations of active ingredients below that specified, rancidity of the oil phagostimulant in baits, or contamination of baits with other products that cause repellency eg synthetic pyrethroid insecticides.

Recommendation #6: In addition to testing the Advion bait under Australian field conditions, that BQCC further test bait treatment methods, and introduce standard product testing protocols to ensure insecticides used for the eradication of fire ants in the program meet specifications for amount of active ingredient, oil type and rancidity, plus the presence of any other pesticide contaminants that could lead to bait avoidance by fire ants.

Market Gardens

Market gardens are defined as small farms devoted to raising vegetables, fruits, and/or flowers. Market garden growing areas may be open fields or enclosed semi-permanent greenhouses with dirt or hard floors. The climate of the Brisbane area allows crops to be grown throughout the year.

Market gardens have been documented to have unexpected recurring fire ant infestations (monogyne and polygyne). On the surface, it appears that protocols for these areas are adequate, e.g., bait is spread on fields, and if crops are near harvest, a crop shaker is used to apply bait in between rows. Greenhouses with dirt floors are bait-treated as for the fields, and greenhouses with hard floors are treated around the periphery by injection. These facilities are in production throughout the year, thus crops are watered as needed year round. The reason for this apparent anomaly of poor control needs to be researched using the historic database (FAIS), genetic data, further treatment experiments in the gardens themselves, and other resources in order to develop a treatment/surveillance strategy that will alter the current situation.

The above and other abnormal fire ant new colony distributions need to be recognized as opportunities to solve problems associated with surveillance and control protocols.

Recommendation #7: Given their particularly problematic status, surveillance and control of fire ants in market gardens, and the lessons this may have for other potential and actual control failures, should be a priority for investigation.

Economics and Cost-Benefit Analysis (CBA)

The Review Panel carefully examined the two cost-benefit analyses on RIFA in Australia, and a spreadsheet and related documents indicating projected budgets

(based on current protocols) of the National Red Imported Fire Ant Eradication Program. The two cost-benefit analysis (CBA) studies are:

- Tom Kompas and Nhu Che, *An Economic Assessment of the Potential Costs of Red Imported Fire Ant in Australia*, Australian Bureau of Agricultural and Resource Economics, Canberra, 2001
- George Antony, Joe Scanlan, Alex Francis, Karl, Kloessing and Yen Nguyen, *Revised Benefits and Costs of Eradicating the Red Imported Fire Ant*, Queensland Department of Primary Industries and Fisheries, Brisbane, 2009.

Although the Antony et al. (2009) study builds on the estimates contained in Kompas and Che (2001), the Panel determined that the two CBA studies are for the most part not comparable for the following reasons:

(a) Kompas and Che use a linear spread model (the best available at the time) to estimate the dispersal of RIFA along portions of the east coast of Australia (including parts of NSW and a limited portion of Victoria), allowing for considerable random error in the spread of RIFA. Anthony et al., on the other hand, use a more updated version of the spread model, but in deterministic form and for only a major part of Queensland.

(b) Kompas and Che focus only on market values as the estimates of the damages from RIFA, concentrating on losses in property values and damages to equipment, health and agricultural production. Anthony et al. focus instead – and this is its main and useful contribution – on measures of losses in ecosystem services due to RIFA, using a benefits transfer methodology based on a comparable study in New Jersey (USA).

The method used by Antony et al. gives much larger potential damages and a benefit-cost ratio (BCR) from the eradication of RIFA of 390:1, compared to 25:1 in Kompas and Che. That said, it is clear that both Kompas and Che, and Antony et al. potentially underestimate the total potential damages for RIFA by either not including potential environmental and recreational impacts, or limiting the spread of RIFA to Queensland only. It is also clear, given the huge difference in the BCR in the two studies, again acknowledging that they are to a large extent non-comparable, that there is a potential lack of precision in the overall estimates of the relative costs and benefits of eradicating RIFA.

The Review Panel thus recommends the following course of action:

Recommendation #8: An updated, definitive and properly peer-reviewed Cost Benefit Analysis for the control and potential eradication of RIFA be conducted, including analysis to determine key areas (e.g., regions) where containment and/or suppression is likely to be most cost effective.

There are several good reasons for this:

- (1) It is clear that both Kompas and Che, and Antony et al. seriously underestimate the control and potential eradication costs of RIFA, both in

terms of per hectare charges and the overall and various components of the RIFA eradication program. This can seriously affect the resulting BCR.

- (2) Second, a clear and peer reviewed measure of the potential damages of RIFA still needs to be constructed. This can be done in a relatively easy way by combining and extending some existing and recent work, in particular, by extending the recent Monash spread model (and related work at the University of New England), and incorporating measures of recreational and amenity value losses from RIFA generated by a study undertaken at the Central Queensland University through the Australian Centre for Biosecurity and Environmental Economics at the Australian National University. The latter provides more accurate choice-modelling survey estimates (based on sampling techniques of the Australian population) of environmental damages from RIFA, without needing to fully and only resort to the potentially controversial benefit-transfer methodology based on the New Jersey (USA) model. This would add an important dimension to the CBA, augmenting its precision and credibility. Building an updated CBA on the latest spread model would also allow for both stochastic variation in the spread of RIFA and spread patterns that include damages to NSW, the ACT and Victoria, if not beyond. The final updated CBA would thus include confidence intervals on the BCR allowing for various cases (e.g., market valuation only, market valuation with choice-modelling estimates for recreational losses and amenity damages, and a CBA that also includes all of this and some recalibrated benefit transfer amounts). An updated study would also incorporate all of the known measures of uncertainty in the spread model and estimates of market and non-market values showing various benefit-cost ratios and associated probabilities. Importantly, this would allow decision makers to assess the range of candidate benefits and costs and their likelihood.
- (3) Both Kompas and Che, and Antony et al. construct their cost-benefit analyses assuming that RIFA will be eradicated within a given time period. This conditions the assumed cost of the program, and can greatly alter the overall measures of the costs and benefits over time. An updated CBA analysis should be constructed for both a potential eradication program and for one of containment or suppression of RIFA, at least over some period of time.
- (4) Allocating scarce resources over the range of potential and realized invasive species in Australia requires accurate measures of the relative costs and benefits of any biosecurity action. An updated CBA would provide this and allow for careful peer review to underscore the credibility of its measures and calculations.

The 2010 Fiscal Year Budget

In the documents examined by the Review Panel on this matter, it was unclear what measures and outcomes (e.g., containment, eradication or suppression) were assumed in order to estimate the projected costs of the program. More accurate measures on cost per hectare based on different outcomes are also needed, both for proper external evaluation of the cost effectiveness of the program and as inputs to an updated CBA.

In terms of the projected budget (based on the current protocol) of the National Red Imported Fire Ant Eradication Program, the Review Panel makes the following recommendation:

Recommendation #9: The assumptions behind and potential outcomes of the current operating budget, in terms of both the current protocol and any potential changes to that protocol in the future, be clearly articulated.

Eradication, Containment, or Suppression?

There are two pathways for the spread of RIFA. There is spread based on natural processes and human-mediated spread, which relies directly on human activity. Natural spread appears to be ongoing with RIFA and we anticipate that without an effective surveillance and eradication program, spread to other suitable regions of Australia will occur. This process is slow (less than 10km a year) and could be slower in less disturbed environments based on the experience in Brisbane.

Human-mediated transport can occur over much greater distances in much shorter time frames. Human-mediated vectors are varied. Industrially, there is earthmoving associated with construction and the trade in plants and horticulture supplies. Privately, there is movement of potted plants outside of commerce and small amounts of soil and other landscape materials.

Eradication is currently not possible because of the lack of adequate surveillance and confidence in treatment methods.

However, the existing economic analyses suggest that the maximum value of measures comes from preventing the long distance dispersal to other urban centres such as Sydney or Melbourne. The probability of this kind of dispersal can be reduced by a number of actions. For industrial pathways, government control and certification of movements of risk materials can be performed under existing models. For private pathways, education and reduction of density of RIFA in heavily populated areas can be considered. Reduction of RIFA in urban areas will reduce the chance that a colony is translocated in potted plants or other similar means. Limiting attention for containment to urban areas ensures that the treatment area is finite and the task is well defined.

Thus, a program that combines active RIFA suppression in the urban Brisbane area along with aggressive containment methods to limit the probability of human-assisted RIFA transport to other population centres will reduce the National risk while improvements in eradication technology are investigated.

Recommendation #10: To protect the cost-sharing partners' investment to date in the eradication of Red Imported Fire Ants, BQCC develop and implement a cost-effective containment strategy to suppress fire ant populations and control the potential human-mediated movement of fire ants for 18-24 months while key research can be completed to demonstrate the successful use of remote sensing for surveillance, and the improved control efficacy of pesticide treatments. After that time, another review should be

undertaken to determine feasibility of eradication in light of any new advances.

Should an eradication program be contemplated in the future, it will be important that appropriate milestones relating to the size and rate of expansion of the restricted area, number of colonies re-establishing on previously treated areas, etc., be included in the program proposal. This will enable annual assessment of the success of any future eradication program to be made.

To summarise, indicators for long term success for eradication would be development of an effective remote sensing system for low fire ant densities; development of a more realistic simulation model; demonstration of the effectiveness of fire ant baits under Australian conditions; and completion of a peer-reviewed cost-benefit analysis from which decisions can be made. Each of these potential accomplishments contribute to the possibility for eradication.

Specific Responses to Terms of Reference

1. Identify and, if possible, fill gaps in knowledge and information that will allow an objective determination of the technical feasibility of eradication and in-depth evaluation of alternative management options

As detailed above, while a range of alternative technologies have been contemplated to assist the current program (e.g., sniffer dogs, remote sensing, computer modelling), further detailed research and development is required to identify their possible role within an eradication program.

As outlined above, various preliminary computer models indicate the success of eradication is heavily dependent upon early detection of colonies so that they can be destroyed before the ants have had an opportunity to disperse and establish new colonies.

Given that RIFA colonies have been identified in a large area of agricultural and other non-urban land to the south of Ipswich, an alternative surveillance option to those currently available, will need to be developed before a further attempt at eradication is contemplated.

While the adoption of remote sensing technology would appear to provide a possible solution to detection of colonies sparsely dispersed over a large area (20,000+ ha), the information provided to the Review Panel indicates that further refinement and testing of this technology is required. If this technology can't be developed as an effective surveillance tool for identification of colonies in broadacre situations, any future eradication program would not be successful at a reasonable cost without the development of an alternative surveillance technique that was effective in this situation.

It should be noted that the Fire Ant Restricted Area has expanded to 93,000 ha since the program commenced. The difficulty that the program has experienced in delimiting the extent of the incursion highlights the need for an effective technique for surveillance of that area which is 10-15 km outside the current boundary of the Restricted Area. Until the boundary of the current incursion is accurately defined, attempts at eradication will be frustrated as new colonies (outliers) are identified outside the boundary. Whether they had been present for many years and not previously detected, or were recently established, will have important implications for a future eradication program.

2. The long term outlook for the program, including the feasibility of eradication of Red Imported Fire Ants (RIFA)

While impressed at the enormous potential economic and environmental losses from widespread establishment of the fire ants, the great dedication and effort that has been shown by the eradication team for more than 8 years, and that this effort has surely slowed the increase of RIFA populations, the Review Panel could not convince itself that RIFA can be considered to be eradicable in Brisbane using the current techniques. The simple facts are that the total restricted area in the program has annually increased to over 93,000 ha as additional sites have been found outside the original containment areas, and there seems to be no decline in the number of sites found for search effort expended. BQCC report that detected colonies for 2006/07, 2007/08 and 2008/09 were respectively 599, 554 and 556, with what appears to be a decrease in sampling effort. This is at least qualitatively consistent with otherwise encouraging modelling from Monash University, which suggests that for every 1 ha plot known by BQCC to be infested, there are another 1.5 plots which are infested of which they are unaware.

While the various Cost Benefit Analyses (CBA) have identified a large “pay-off” from a successful eradication program, the key to achieving those large benefits is complete eradication. While the techniques used to deal with the Gladstone (Yarwun) and Brisbane Ports incursions appear to have eradicated Red Imported Fire Ants (RIFA) in those locations, the Wacol/Richlands incursion in south-east Queensland (Brisbane) has proven more difficult to eradicate.

3. Alternative management options for RIFA in Australia

The Review Panel has identified that an alternative approach is needed if eradication is to be possible in the medium to long term.

As originally foreshadowed in the 2002 review, the Review Panel recommends that the current eradication program reverts to a program of containment for a period of 18-24 months to enable alternative surveillance and treatment options to be developed. At the end of this period, if technically sound options have been developed, it would be appropriate for a revised eradication program to be considered. The current program continues to be one of suppression; a true containment program demands defined boundaries not to be breached, while continuing to try to suppress within the containment area to reduce the chances of escape of queens.

Should eradication eventually be abandoned for RIFA in southeast Queensland, there are a range of obvious alternatives for RIFA management, ranging from state-by-state efforts to avoid RIFA establishment by phytosanitary practices and eradication programs to local community education with fire ant control. Further, the research promoted in this Review will support a range of alternative management options for RIFA in Australia. Remote sensing technologies and improved baits (and consistency in their use) would aid in the eradication, suppression, or local management of fire ants in regions (and states) beyond southeast Queensland.

4. Analysis of relative merits of alternative management options identified, including how they will impact on the long-term goals of the program.

As detailed in the main body of the report, a proper analysis of alternative management options will depend at least in part on a more detailed economic analysis of eradication, containment and suppression, but also on successes in field research, especially with remote sensing, on which we place a high priority.

That said, complete abandonment of fire eradication, containment and/or suppression continues to be undesirable because of the significant effects on biodiversity, the environment and human activities in general across the potential range of RIFA in Australia.

List of Recommendations with Key Milestones

Recommendation #1: The use of workshops and/or tendering in the future to more effectively engage scientists who are strongly committed to the project. Remote sensing research and development, in particular, seems far too *ad hoc* given its crucial value to the success of the program.

Milestones: 6mo – The BQCC to carefully review the entire scope of scientific work being undertaken and identify tendering needs and call for tenders, in addition to those specifically identified below; 12mo- tender projects needed to contribute to the scientific needs identified in this report and better integrate scientific innovation into the program.

Recommendation #2: Review of the structure and logic of the simulation model against possible mechanisms of failure of the eradication process. Use this to revise the structure of the model.

Milestones: 6mo - organise and conduct a workshop on the available fire ant simulation models to review structure, logic and data needs, involving leading ecological modelling labs in Australia, and with overseas participation as needed; 12mo – tendered for agreed improvements in a leading model and have revisions under way; 18mo revised model completed and tested against existing data sets.

Recommendation #3: Collect empirical data to better calibrate the simulation model to reflect behaviour of the system (treatment and surveillance efficacy, and dispersion patterns).

Milestones: 12mo –following the modelling workshop, have begun collecting and analysing data for model testing and improvement; 24mo – tested the model against all data available, dating back to 2002.

Recommendation #4: A workshop be held involving key researchers in remote sensing in Australia to ensure best practice methods are applied and that potential issues are clearly identified.

Milestones: 6mo - organise and conduct an Australian-wide remote sensing workshop; 12mo - implement workshop recommendations and develop prototype remote sensing system; 18mo - collaborate with Taiwan and/or the United States to evaluate the scope and limitations of the prototype system on fire ant populations of various densities; 24mo – fine tune the remote sensing system, with few false positives and negatives, for the low fire ant colony densities expected in Queensland.

Recommendation #5: Continue to emphasise Community Engagement to enhance passive surveillance activities, and maintain the currently recognised “brands”, including the “no fire ant” symbol.

Milestones: 6mo – implementation of revised community engagement program that utilises currently recognised “brands, including the “no fire ant” symbol, and explains the new phase (containment) of the program and the important role of the community.

Recommendation #6: In addition to testing the Advion bait under Australian field conditions, that BQCC further test bait treatment methods, and introduce standard product testing protocols to ensure insecticides used for the eradication of fire ants in the program meet specifications for amount of active ingredient, oil type and rancidity, plus the presence of any other pesticide contaminants that could lead to bait avoidance by fire ants.

Milestones: **6mo** – establish standard insecticide testing protocols; **12mo**-have undertaken properly controlled and statistically valid tests of the Advion bait in Australia in comparison with other insecticidal treatments.

Recommendation #7: Given their particularly problematic status, surveillance and control of fire ants in market gardens, and the lessons this may have for other potential and actual control failures, should be a priority for investigation.

Milestones: **6mo** – develop and implement a specific research protocol for surveillance and control of fire ants in market gardens, and any other problematic situations; **12mo** - research underway; **18-24mo** – interim and then final written report on improved practices for surveillance and control of fire ants in particularly problematic situations.

Recommendation #8: An updated, definitive and properly peer-reviewed Cost Benefit Analysis for the control and potential eradication of RIFA be conducted, including analysis to determine key areas (e.g., regions) where containment and/or suppression is likely to be most cost effective.

Milestones: **6mo** –complete draft updated CBA and submit for peer review. (It is important to do this as soon as possible to help inform priorities for containment and suppression programs.) **12 mo**-CBA has been peer reviewed.

Recommendation #9: The assumptions behind and potential outcomes of the current operating budget, in terms of both the current protocol and any potential changes to that protocol in the future, be clearly articulated.

Milestones: **6mo** –written statement clearly defining the assumptions behind current (and proposed) operating budget(s).

Recommendation #10: To protect the cost-sharing partners' investment to date in the eradication of Red Imported Fire Ants, BQCC develop and implement a cost-effective containment strategy to suppress fire ant populations and control the potential human-mediated movement of fire ants for 18-24 months while key research can be completed to demonstrate the successful use of remote sensing for surveillance, and the improved control efficacy of pesticide treatments. After that time, another review should be undertaken to determine feasibility of eradication in light of any new advances.

Milestones: **6mo** – strategy developed and provided to cost-sharing partners; **18mo** – A follow-up review planned if progress warrants.

Panel Findings

After considering and discussing the methods and results from the molecular genetics program for the NRIFAEP the panel made the following statements:

1. *The expectation for a RIFA incursion after 10 years is that there would be no decrease in genetic variation and limited sub-structuring of the population due to genetic mixing via natural mating, migration, and human-assisted transport. The opposite of this is observed in Queensland, strongly suggesting that the eradication program is being effective. Evidence for this includes:*
 - *There is lower genetic diversity in the remaining Australian population than is observed in other invaded countries and genetic diversity is decreasing over time. In countries without an effective eradication program no such reduction is observed in the genetic diversity of their populations.*
 - *There is evidence of inbreeding which is not observed elsewhere. This suggests that the Program is disrupting the mating system and causing the loss of genetic diversity.*
 - *The Program may be causing population fragmentation, which is reflected in the development of sub-populations. This is not observed elsewhere.*
 - *The remaining Brisbane population is clearly derived from a single source, strongly indicating that there are no undetected populations (as distinct from colonies) on the margins of the known infested area*
 - *When new colonies are detected, a high proportion (approximately 75%) can be traced back to known colonies. This indicates that the majority of colonies are being detected by the surveillance program.*
 - *The polygyne form of RIFA has been substantially reduced. The polygyne form is the most invasive and destructive ecotype. In the absence of an eradication program, polygyne RIFA would be expected to be very widespread as seen in other invaded countries.*

The overall reduced genetic variation within the RIFA population may result in reduced fitness and adaptability, as has been reported for some other invasive species.
2. *The Panel found the methods used for the genetic analysis are appropriate and sound for ongoing use.*

Recommendations

The Panel made the following recommendations for future analysis:

- Simulate a short-term bottleneck versus a long-term bottleneck to compare and contrast the effects on the genetic diversity and to provide a framework for testing hypotheses using empirical results.
- Further verify the pedigree technique with empirical data to be supplied by the USDA.
- Investigate the role of founder effect in the formation of sub-clusters.
- Continue integration of data for the investigation of the origin of any new incursions in future.
- Increase international cooperation to accurately identify the origin of new incursions. Ensure that all new incursions/interceptions of RIFA are thoroughly

investigated with a view to identifying the source, which will help to mitigate the risk of new incursions.

- Investigate collaboration with Taiwan and the USDA to examine the DNA sequence of a putative sex locus ortholog and the feasibility of application to measuring the increase in the frequency of sterile diploid males.
- Adopt techniques used for RIFA for other pests.

DAF RTI DL Release

NATIONAL RED IMPORTED FIRE ANT PROGRAM
FORUM ON TECHNICAL DEVELOPMENTS IN THE DETECTION AND ERADICATION
OF RED IMPORTED FIRE ANT

Background

Since the National Red Imported Fire Ant Program (the program) began in 2001, there has been major development in technologies and understanding about the biology/epidemiology of the ant, which can contribute to the ongoing eradication program. Recent research has been in response to the 2009 Independent Review conclusion that eradication was not feasible using current techniques, and recommendation that the program enter a suppression and containment mode for 18–24 months to allow research on remote sensing and treatment efficacy, to guide decisions on funding beyond 2011–12. The key risk to the program is delineation of the extent of the fire ant infestation. Remote sensing, which has the capacity to survey up to 75 000 ha per year provides a tool to address this risk. Other developments have been in:

- modelling (habitat, spread, program simulation)
- genetic analysis (social form, population assessment, colony relatedness)
- surveillance tools (remote sensing, odour detection dogs, passive surveillance)
- treatment efficacy
- population biology, and
- habitat preference.

A forum of national technical and scientific experts was convened on 1–2 February 2012 with the following terms of reference.

Term of reference

1. Review the technical developments used by the program in the detection and eradication of the fire ant.
2. Provide comment on the time that is needed for delineation to occur and what balance of surveillance tools is required.
3. Provide comment on the program approach towards returning the program to an eradication mode.
4. Identify any additional promising avenues of applied research that may add value to the program.

Participants

Mike Cole, Office of the Chief Plant Protection Officer (Chair)
Paul De Barro, CSIRO
Wee Tek Tay, CSIRO
Simon Barry, CSIRO
Peter Baxter, Centre for Applications in Natural Resource Mathematics (CARM), the
University of Queensland
Jonathan Keith, Monash University
Antonio Robles-Kelly, NICTA
Royce Holtkamp, Biosecurity NSW
John Burley, Biosecurity Victoria
Ahmed Kafi, ABARES
Kris Morey, ABARES
Ross Lewin, Outline Global
Andrew Coleman, Outline Global

Alistair Reid, Australian Centre for Field Robotics, University of Sydney
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Program participants

Neil O'Brien, BQCC
Craig Jennings, BQCC
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Heather Leeson, BQCC
Anthony Wright, BQCC
Georgie Lucas, BQCC
Jane Oakey, BQCC

Panel findings

1. *The panel noted that the activities undertaken by the National Red Imported Fire Ant Program (the program) have continued to suppress Red Imported Fire Ants (fire ants).*
2. *The panel concluded that the overall surveillance package (including remote sensing and community surveillance) will enable the program to know within three years whether the infestation has been delimited or not.*
3. *The panel found that remote sensing technology can detect fire ants at levels that would support successful delimitation.*
4. *The panel noted that spread/simulation modelling of the new strategies will be completed over the next financial year which will give an estimated time and level of confidence of achieving eradication.*
5. *The panel recommended a review after the next surveillance season (March-September 2012) to assess progress toward delineation.*
6. *The review panel recommended that NMG endorses the Fire Ant Future Program for 2012–15.*

Recommendations

The panel made the following recommendations for further analysis:

- Relate the observed decrease in the genetic diversity of fire ants in Queensland, caused by the eradication pressure of the program, with biological fitness of the ant.
- Conduct modelling to determine the level of confidence in delimiting the fire ant infestation using remote sensing.
- Determine remote sensing detection rates at low density of fire ant infestation, including false-positive and false-negative rates, and institute quality assurance standards for screener performance and data integrity.
- Summarise results of remote sensing and provide advice by December 2012 to the Tramp Ant Consultative Committee.
- Examine past weather data to determine the likely number of remote sensing flying days each year that will provide optimal degree of fire ant mound detection.
- Produce a delimitation map utilising all levels of surveillance.
- Examine the effects over time of large-scale site disturbance and of program bait applications on native populations of ants in relation to the degree of native ant predation/ competition with fire ants.