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Making Better Fertiliser Decisions for Grazed Pastures in Australia – Technical Exchange Year

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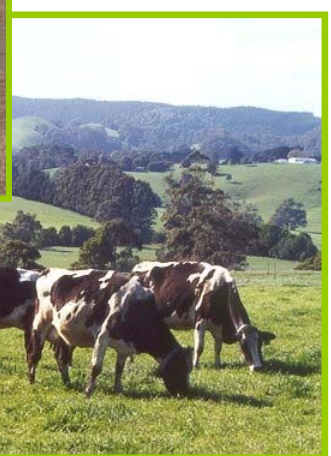
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Making Better Fertiliser Decisions for Grazed Pastures in Australia – Technical Exchange Year

(July 2006–June 2007)

DAV 11211

Final Report
June 2007



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1 EXECUTIVE SUMMARY

Fertilisers containing N, P, K and S continue to be a key requirement for the Australian grazing industries. However, increased community concerns about excess nutrients in water and the atmosphere means that farmers and service providers need access to the best possible information regarding optimum nutrient management practices for environmental as well as productivity benefits. The Better Fertiliser Decisions (BFD) project provides a more tailored approach to nutrient management, based on the best available information for soil test targets and an improved understanding of nutrient loss processes and pathways. This will lead to improved nutrient efficiency on farm and reduced excess nutrients in the environment.

The Better Fertiliser Decisions Technology Exchange Year (BFD TEY) was funded for the 2006-2007 financial year, as a way to gain maximum industry impact from the investment in the BFD project, which was completed in June 2006. The principal objectives of the BFD project were to (i) provide regionally specific and scientifically validated fertiliser-pasture production responses for various pasture types, climatic zones and soil types, (ii) better define fertiliser management practices that account for nutrient loss processes and pathways, and (iii) integrate production and environmental information into material and tools that can assist industry and government networks including fertiliser company advisers, environmental agencies, consultants, extension officers and farmers.

The BFD project delivered the most comprehensive collation and interpretation of soil test calibration studies for pasture production ever undertaken in Australia and probably internationally, as well as a 'Farm Nutrient Loss Index' (FNLI) to assist farmers and advisors identify areas of environmental risk on their farms and take steps to reduce nutrient losses.

The goals of the Technology Exchange Year were to further develop BFD project products, including production of technical and extension information, and embed the project outputs into industry training and decision support programs. An important part of this process was to gain industry-wide acceptance of BFD products through critical analysis and discussion with industry specialists to generate trust and fully understand the implications of the project for the grazing industries.

Key achievements of the project include:

- Quality checking of all soil test and pasture response data.
- Thorough statistical analysis and interpretation of soil test – pasture response relationships to develop a consistent, relevant approach to identify appropriate soil test levels for each soil type, region and enterprise.
- Discussion and revision of soil test – pasture response relationships to address concerns of agronomists.
- Final soil test – pasture response relationships and FNLI available at www.asris.csiro.au and in hardcopy.
- Project products distributed to more than 100 farm advisors that expressed interest in the results of the project.
- Project products distributed to key stakeholders and contributors to the project.
- Agreement with FIFA to incorporate the soil test – pasture response relationships and FNLI into courses and FIFA's accreditation program.
- Major Australian fertiliser companies, IPL, CSBP, Impact and HiFert, have expressed interest in using project outputs in their fertiliser recommendation systems and software.
- Training sessions delivered to extension staff from DPI NSW, DPIV, and DPIF WA.
- Training sessions held with IPL, CSBP, Impact and Fertcare® deliverers to assist integration of products into industry.
- Project results presented at 6 industry conferences and featured in 6 industry newsletters and 2 commercial rural press articles.

- Numerous awareness-raising presentations, both nationally and internationally, with stakeholders such as Regional Dairy Boards, CMAs, research and industry groups.

2 BACKGROUND TO THE TECHNICAL EXCHANGE YEAR

The Technical Exchange Year was initiated to capitalize on the results of the BFD project. In order to understand the importance of the Technology Exchange Year, some insight into the development of the BFD project is useful.

The Better Fertiliser Decisions project

The BFD project commenced in July 2003 and was successfully completed in June 2006.

The objectives of the BFD project were:

(i) To provide regionally specific relationships for soil test - pasture response functions for phosphorus, potassium, sulfur and nitrogen fertilisers (and where possible animal production responses) from existing data for extensive and intensive pasture systems across Australia, through an interactive database.

(ii) To review and develop tools that identify landscape characteristics, soils and farm management practices that contribute to impacts on the environment, and to integrate Environmental Risk Assessment and nutrient response functions.

(iii) To disseminate consistent and regionally specific nutrient response relationships and Environmental Risk Assessment tools to regional industry and government networks including fertiliser company advisers, consultants, extension officers and farmers to provide greater skills and confidence in fertiliser decision-making.

To this end, the BFD project, through a National Network team (NN) of leading scientists and fertiliser agronomists from all states of Australia, identified and collated a comprehensive set of Australian pasture and animal production fertiliser response data. In excess of 300 experimental data sets were collated consisting of approximately 2500 sites and over 4500 experimental trial years. The data sets were standardised and compiled in a specifically designed National Database, where the data could be explored and interpreted. Importantly, disparate datasets have been integrated to derive the most appropriate response relationships for different soil textural classes, at a regional, state, and national scale.

The FNLI was developed as both a paper based version and a Visual Basic software version. The regionally specific FNLI is based on a review of Australian and overseas literature and knowledge harnessed from National Network participants. A series of 9 regional technical review workshops, as well as farm assessments, across all grazing regions of Australia, were used to refine the FNLI for regional differences in nutrient loss pathways and processes. These participatory workshops involved over 90 technical experts in nutrient management including researchers, educators, extension officers, fertiliser industry agronomists and natural resource managers. The FNLI predictions compare favorably with known water and nutrient loss measurements.

The communication-related activities within the BFD project importantly maintained a strong link and focus with the next users, most notably the fertiliser industry. Discussions and regular industry meetings have facilitated a common understanding, improvements and acceptance of project tools and information. There was also information directed to farmers and the broader community through the media so that the industry groups are 'primed' for project outputs. The project outputs are also receiving national and international review from scientific peers, through national and international conferences and journal papers.

Further details on the design, methods and results of the BFD project can be found in the comprehensive final milestone report.

The Better Fertiliser Decisions Technical Exchange Project

The BFD TEY project (July 2006 – June 2007) was undertaken in order to build on the momentum developed by the BFD project and capitalise on the strong 'brand awareness' that already exists.

Specifically, the Technology Exchange Year was funded to:

- further embed the BFD project products into industry training and decision support programs and state department extension programs.
- allow for further critical analysis and discussion of the project outcomes with industry specialists, with due consideration of the implications for the grazing industries, and
- develop opportunities to access new audiences.

The BFD Technical Exchange Year project had widespread national support from Dairy Australia, Meat and Livestock Australia, Land and Water Australia, the National Land and Water Resources Audit, the Fertiliser Industry Federation of Australia, Incitec-Pivot Limited, CSBP, HiFert, Canpotex-Agrow, Impact Fertilisers, DPI Victoria, WA Department of Agriculture and Food (formerly Agriculture WA), SARDI, NSW DPI (formerly NSW Agriculture), DPI Qld, DNRM Qld, Tasmanian Institute of Agricultural Research, DPIWE Tasmania and EPA Victoria.

3 DELIVERABLES IN THE TECHNOLOGY EXCHANGE YEAR

1. Develop a project booklet with interactive CD, including the key findings from BFD project, the National Database, and the FNLI, which will allow ready and ongoing access to information and decision support tools.
2. Deliver the CD and booklet to 80-100 beef, sheep and dairy advisors, targeting state government extension staff and consultants, and 20 fertiliser company and retail partner staff.
3. Conduct at least 2 training workshops on the project outputs for state government extension staff.
4. The National Database, soil nutrient response relationships, and the FNLI, integrated into the Fertcare® training program, the FIFA auditing program, and where appropriate, the decision support programs of the major fertiliser companies operating within Australia.
5. Ensure that the FNLI is available to beef, sheep and dairy producers across Australia.
6. In consultation with the Land and Water Resource Audit and the Australian Collaborative Land Evaluation Program (coordinated by CSIRO) undertake the successful transfer of the National Database to ensure its maintenance and appropriate availability through the Australian Soil Resource Information System (ASRIS).
7. Present the project outputs at 3 industry conferences, and via 6 industry/state primary producer newsletters.
8. Take opportunities to report on project outputs to other key stakeholders, which may include CMAs, State EPAs, etc.
9. Submit 2 scientific papers for publication.

4 PROJECT TEAM

4.1 Science Management Team

The team was based at DPI Victoria, Ellinbank Centre:

Cameron Gourley	Science Leader
Alice Melland	Agri-Environmental Scientist
Raquel Waller	Nutrients and Ecosystems Scientist
Ivor Awty	Senior Technical Officer
Murray Hannah	Senior Biometrician
Sally Sceney	Project Officer
Donna Gibson	Technical Officer

4.2 Project Implementation Committee

The Project Implementation Committee was responsible for providing strategic advice and endorsement of activities during the Technical Exchange Year of the BFD project.

Specifically it had responsibility for:

- Reviewing progress at different stages of the project according to specific timelines and milestone reports.
- Communicating with various stakeholders to capitalise on the strong awareness associated with the project and build on the project products and technical and extension information.
- Identifying further opportunities for information transfer and access to various audiences leading to enhanced adoption of project outcomes.

Nick Drew	Fertiliser Industry Federation of Australia (FIFA) and Chairperson
Cameron Allan	Meat and Livestock Australia (MLA)
Ken Peverill	Dairy Australia (DA)
Nigel Bodinnar	Incitec Pivot Limited (IPL)
Brendan Edgar	Land and Water Australia (LWA)
Peter Flavel	HiFert
Peter Orchard	NSW Department of Primary Industries
Blair Wood	National Land and Water Resources Audit (NLWRA)
Wayne Pluske	Nutrient MS (Fertcare®)
Cameron Gourley	Department of Primary Industries Victoria
Raquel Waller	Department of Primary Industries Victoria

5 PROJECT ACHIEVEMENTS

The Technology Exchange Year for the BFD project is designed to capture the valuable information from the national BFD study and ensure that the fertiliser and grazing industries achieve maximum benefit from this extensive research project. To reduce repetition in this report, the nine deliverables of this project have been grouped into four key result areas (Table 1).

Table 1. The four key result areas and the associated deliverables.

Key results areas	Associated deliverable(s)
1. Prepare, publish and distribute the BFD booklet with CD and website	1, 2, 5, 6
2. Deliver outputs to the fertiliser industry	4
3. Deliver outputs to other key stakeholders	3, 7, 8
4. Prepare and submit scientific papers	9

The following section outlines the actions taken to address the deliverables for this project.

5.1 Prepare, publish and distribute the Better Fertiliser Decisions products

A simple and practical booklet was identified within the BFD project as an important publication for providing the key project outputs to a broad range of stakeholders, including farmers, advisors, field officers, fertiliser field staff, and departmental extension officers. The booklet provides information about the soil test – pasture response relationships and the FNLI, with the FNLI and User Manual on the accompanying CD. The website will allow access to the project results by interested people that are not targeted in the technical booklet distribution. The website will also allow ongoing access to the decision support tools, and can be updated if further information becomes available.

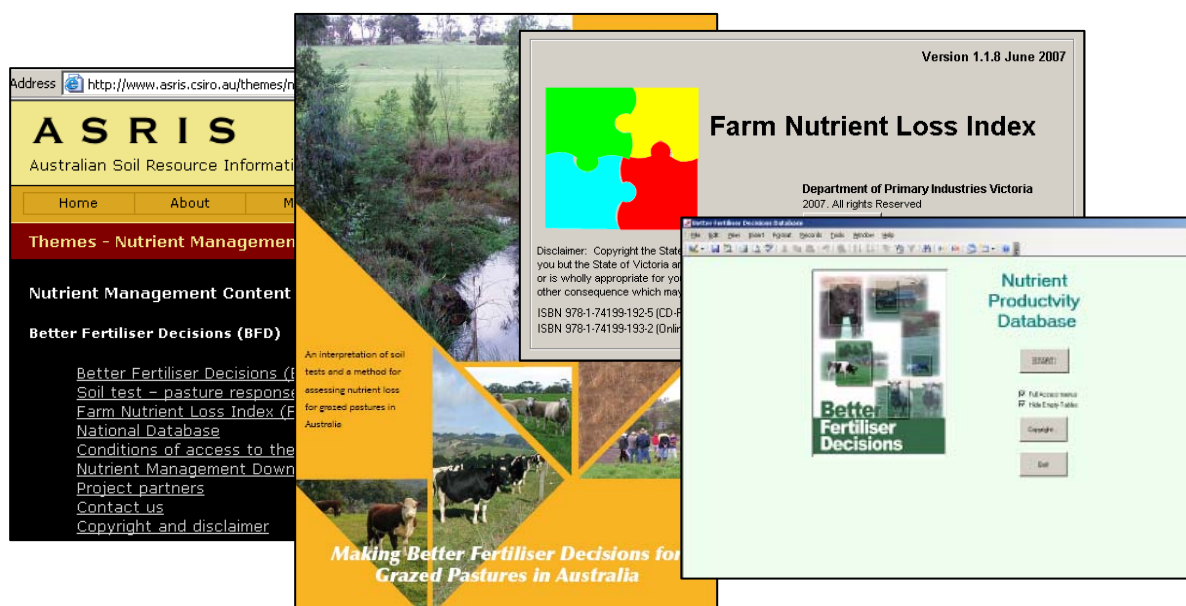


Figure 1. The products developed during the Better Fertiliser Decisions project (2003-2007): a website containing the results and publications, a technical booklet containing the soil test – fertiliser response relationships and an introduction to the FNLI, with accompanying CD containing the FNLI program and User Manual, and a National Database containing the data submitted to the project with a flexigraph interface.

Prior to publication, a detailed quality review of soil test – pasture response data was undertaken which involved follow-up discussions and analysis with data contributors. Extensive further statistical analyses were conducted to further refine calibration relationships and also explore some specific feedback from regional agronomists and scientists.

The soil-test pasture response database was completed and is now available to registered users. A policy of registering users was developed to avoid misuse of the submitted data.

Similar refinements and improvements were made to the FNLI information, presentation and programming during the BFD Technical Exchange Year.

The technical booklet, complete with CD, has been published and will be distributed throughout June and July 2007 to over 100 farm advisors, including fertiliser companies and retail partner staff.

A significant achievement has been the establishment of the BFD web page within the CSIRO Australian Soil Resource Information System (ASRIS) internet site <www.asris.csiro.au>. The 'Themes' section of the ASRIS site contains project information, results and publications, information on how to access the complete soil-test pasture response National Database, and download facility for the technical booklet, the

FNLI software program and its User Manual. This linkage will significantly broaden the access of the information not only nationally but world wide, while ASRIS will take responsibility for updates and maintenance of the site.

With the publication of the technical booklet, FNLI CD and User Manual, and the establishment of the BFD website, there has been an extensive promotion of the project and how to access the outputs, using industry newsletters and rural press.

To ensure that every opportunity is taken to promote awareness of the BFD products, a coordinated series of media articles were organised in June 2007. These articles, pitched at all major rural newspapers and industry magazines, provide details of the various products and how they can be accessed. Farm advisors, fertiliser resellers and producers are the target audience for the articles.

5.2 Deliver outputs to the fertiliser industry

The BFD project team always recognised that the fertiliser industry, including the network of agribusinesses supplying fertiliser, fertiliser spreaders, individual fertiliser companies, The Fertiliser Industry Federation of Australia (FIFA) and the Fertcare® program, is the key next-user of information and tools delivered from the BFD project. In this Technology Exchange Year, the fertiliser industry and other related stakeholders played an active role in directly using project outputs, and distributing information from the project to their networks.

Two key fertiliser industry players, FIFA and Incitec Pivot Ltd, have already agreed to directly incorporate BFD project outputs. The Fertcare® program is the national training and accreditation initiative for environmental stewardship coordinated by FIFA. For a fertiliser company to become accredited, staff must undertake Fertcare® training, and the company needs to achieve accreditation for responsible fertiliser handling. Accreditation is strongly supported in the industry. Fertcare® has agreed to incorporate the BFD project outputs within the next 12 months as part of their training and delivery.

Incitec Pivot Ltd has committed to incorporate the new national soil test response relationships into their soon-to-be-revised fertiliser decision support system. They have also committed to using the FNLI, and integrate both the refined response relationships and the information provided by the FNLI within their day-to-day fertiliser recommendations.

The project team worked with Fertcare® delivery staff to give them experience and expertise in using the FNLI and soil test – pasture response relationship results. These interactive sessions have resulted in finetuning so that BFD results can be smoothly embedded into Fertcare® training programs.

Additionally, the Fertcare® program will use the new national soil test response relationships from the BFD project as the benchmark for comparison of soil test recommendations from all fertiliser companies seeking Fertcare® accreditation.

A detailed list of activities developed in consultation with key stakeholders is provided in Appendix 1.

5.3 Deliver outputs to other key stakeholders

The Technology Exchange Year has provided the opportunity for project staff to deliver information and tools from the BFD project to other key stakeholder groups including state government extension staff, CMA staff, and industry field staff (such as dairy factory field staff). The training gives these staff expertise in using, explaining and delivering the BFD tools and information. Refer to Appendix 1 for details of activities related to delivery of outputs to stakeholders.

The BFD project team contributed at independent forums, such as presenting at farmer and industry meetings and conferences, and speaking at field days. Conferences include verbal presentations at two FIFA annual conferences, the Victorian Dairy Conference, poster presentations at Grasslands Society of Southern Australia and Grassland Society of NSW, and an interactive display at the combined National EMS in Agriculture and National on Farm Food Safety and Quality Assurance conference.

Articles have been prepared for a variety of industry magazines and newsletters, with a series of articles for rural press prepared for release in late June-July.

Other awareness-raising opportunities included international presentations to USDA Dairy Forage Research Centre, Madison, Soil Science Department, University of Madison, Farming Systems Research Meeting, Wisconsin USA, and SERA-17 meeting University of Arkansas, and a working group meeting of the European Commission in the field of Scientific and Technical Research conference in Norway.

5.4 Prepare and submit scientific papers

The comprehensive collation and analysis of information for soil-test pasture responses to fertiliser, the review of nutrient loss processes and the development of the FNLI are key scientific and technical achievements which will be described in peer reviewed scientific journals.

- The literature review of nutrient loss processes and pathways is nearly ready for submission.
- The FNLI technical manuscripts are currently being prepared.
- A series of soil-test calibration papers to be submitted to Australian Journal Soil Research are in preparation including:
 - Colwell and Olsen phosphorus.
 - potassium soil tests.
 - sulfur soil tests.

6 QUALITY TESTING OF BFD PRODUCTS

The activities proposed in the TEY submission were modified in accordance with identified issues to achieve a successful project outcome; most notably the acceptance and incorporation of the BFD information into fertiliser decisions making. This should be seen as a strength of the project team, in that we recognised the importance of listening to the next-users views and concerns, and ensuring time and effort was directed towards evaluating these issues, improving the capacity to interpret the collected data, and ultimately ensuring that these concerns were addressed.

A major example of adjusting to user requirements was that at one of our first TEY stakeholder meetings in WA (25-28 July 2006), it was suggested that the response relationships were not applicable to WA sands. As a result of this, the project team identified the need to seek further data on PBI and CEC not only for the WA soils, but across all the regions of Australia. This process involved requesting further information from data contributors, collating and reanalysing the data and added a further 5 months to the refinement of the response relationships.

Another example occurred when partway through collecting and collating the new data, a training session was held with IPL on 6 September 2006. This session identified the need to investigate PBI without the specific categories identified by Phil Moody (DPI Queensland), since the national data set is larger than the data set that he used. Further, the difficulty for next users in interpreting the response curves was identified and the decision was taken to progress inverting the response curves to appear as a curve of diminishing returns.

Further presentations were fine-tuned as the new analyses became available and explanations of how to interpret the information were simplified. Feedback from the last few meetings for dissemination of project results (NSW DPI, Impact Victoria and Impact Tasmania) was highly positive, with attendees indicating that they found the training easy to follow.

With the arrival of Raquel Waller, and a fresh eye to look over the data, the data were quality checked for errors (eg nonsensical data entries and transcription errors), which often required seeking further information from the contributor. Further PBI results were identified for the phosphorus dataset. After two months of quality assurance checking, the data were ready for re-analysis. Extensive biometric analysis resulted in the final models and graphs that are now published in the technical booklet.

The final two months of the project have been consumed in finalising the technical booklet and FNLI software. While the principles and scientific design of the Farm Nutrient Loss Index were complete at the end of the BFD project, the TEY period has made it possible to address software compatibility issues so that the program operates on all computer operating systems and configurations.

User and next user reaction to the soil test – pasture response relationships has varied from highly favourable through to criticism by next users who believe they have superior local information. Notably, next users were surprised at the knowledge gaps identified, namely the lack of soil test – pasture response data for K in Qld and SA, and for the KCI-40 S test. We have gone to extraordinary lengths to ensure the data are correct and that the analysis and interpretation is appropriate, in-consultation with key next users. Our results may challenge the foundations of some agronomists' current fertiliser recommendations; hence we anticipate further challenges to the results.

Various versions of the FNLI have been distributed to well over 100 people. Many of these people have provided feedback to Alice Melland and this has been used to make the software interface more user-friendly. Feedback from users indicates they find the FNLI

useful in training situations to explain nutrient loss processes and to help land managers identify where nutrient losses occur on their farms.

7 BENEFITS OF THE TECHNICAL EXCHANGE YEAR

The Technical Exchange Year (TEY) was immensely important to the overall success of the Better Fertiliser Decisions project. The BFD information and products were further refined, feedback and concerns from key next-users was acted upon, training activities were undertaken across a broad range of industry and government players, broad-scale awareness raising of the project and outputs was undertaken, the products were finalised, and access via the web and distribution was developed and completed.

The TEY provided the opportunity for regular contact with a number of different next user groups, such as consultants, fertiliser agronomists, nutrient management tool developers, and government extensions staff. The discussions and resultant additional questions, further investigations and refinements resulted in a greater degree of industry acceptance of the BFD project outputs. The TEY also enabled the project team to facilitate the uptake of the results into industry training and decision support programs and state department extension programs.

The TEY also allowed for substantial critical analysis and market testing of the BFD products with next users and provided the time to finetune the products so that they had wider applicability and acceptability across different industries and regions in Australia. As a direct result, the soil test – pasture response relationships have widespread applicability, and a simplicity that will assist in making transparent fertiliser recommendations for all grazed pastures in Australia.

It should be noted that the TEY did not entirely progress according to the initial plan. More time than was initially anticipated was required to revisit the vast amounts of response relationship data, both in terms of quality assurance and also to address issues relating to further questions and refinement of the soil test calibration curves. Importantly, this has resulted in refinement of the Colwell P calibration equations according to PBI and the Colwell K calibration by way of soil texture classes. All key deliverables relating to completion of the interpretation, development of final information products, and the dissemination and distribution were achieved.

The level of involvement of fertiliser companies varied and thus their enthusiasm for the project results has ranged from direct integration of results into individual company's decision support systems used to develop fertiliser recommendations, through to including only specific outputs that they believed advanced their existing knowledge base.

8 SUMMARY

The BFD Technical Exchange Year project presented an excellent opportunity to consolidate information, work with stakeholder groups and deliver comprehensive, new and improved technical information and tools to industry and nutrient specialists across Australia. The complexity of the task, both from a technical and stakeholder relationship perspective, was considerably greater than the project team envisaged. However, the inclusiveness of the national network team from across Australia and stakeholder support ensured all the key players pulled together to find common ground for this project to succeed.

Key achievements from the project include:

- A comprehensive interpretation of soil test and pasture production.
- A user-friendly software program to assess nutrient loss from paddocks and test alternative management practices.
- A website containing the BFD products for world-wide access into the future.
- An active network of nutrient experts from across Australia.
- Project products distributed to more than 100 farm advisors and retail partner staff, as well as key stakeholders and contributors to the project.
- Agreement with FIFA and IPL to incorporate the soil test – pasture response relationships and FNLI into courses and FIFA's accreditation program, and decision support system, respectively.
- Other major Australian fertiliser companies, CSBP, Impact and HiFert, have expressed interest in using project outputs in their fertiliser recommendation systems.
- Training sessions delivered to extension staff, fertiliser company staff and Fertcare® deliverers to assist integration of products into industry.
- Project widely promoted at industry meetings and conferences and in the rural press.

The final project products and activities are a credit to all those who contributed data and participated in the process. The project team is rightly proud of their contribution to 'better fertiliser decisions' for the Australian grazing industries.

APPENDIX 1 ACTIVITIES AND DELIVERABLES, JULY 2006 – JUNE 2007

Key Result Area	Activities	Relevant deliverable	Date and deliverer	Target audience	Response/ lesson/aim	Next step
1	The technical booklet detailing soil test – pasture response relationships and FNLI.	1/5	Published June 20 2007 – Raquel Waller	FNLI users, fertiliser industry, farm advisors.		Complete
1	FNLI and User Manual	1/5	Published June 20 2007 – Raquel Waller	FNLI users, fertiliser industry, farm advisors.		Complete
1	Distribution and promotion of booklet availability.	1/5	Late June – July 2007 Richard Habgood Sally Sceney	FNLI users, fertiliser industry, farm advisors.		Sally Sceney to handle ad hoc requests for booklet.
1	Technical review of FNLI and user manual.	1	November 2006 – April 2007 Alice Melland Raquel Waller	DPI QA process.	Mark Powell (USDA) and Fiona Robertson review FNLI and user manual. Comments incorporated.	Complete
1	Three media articles are being prepared in late June pitched at rural press and industry magazines.	1/5	June-July 2007 Richard Habgood Raquel Waller	Farmers and farm advisors, researchers	Awareness and profile raising.	In progress
1	Discussions with DPI NSW agronomists regarding the applicability of national response relationships in light of local studies.	1	May 2007 Ken Peverill	Warwick Dougherty, and other DPI NSW agronomists	The need for an FAQ sheet was identified to address common enquiries.	Fact sheet will be available on website by 31 July 07.

Key Result Area	Activities	Relevant deliverable	Date and deliverer	Target audience	Response/ lesson/aim	Next step
1	FNLI and User Manual distributed to approximately 100 people.	2/5	Sally Sceney July 2006-June 2007	Primary distribution based on estimate of ground staff: State extension staff (100), Fertiliser company field staff (600), Dairy company field staff (60), Elders and Landmark via MLA (50), Landcare staff (35), CMA field staff (225).	Feedback sheets distributed with FNLI. Raquel to compile any feedback received.	In progress to be completed by mid July.
1	FNLI presentation and detailed discussion on improvements for WA applicability.	1/2/5	21-23 November 2006 Alice Melland	7 researchers in southwest WA.	Attendees to recommend revised WA weightings for potential inclusion in FNLI.	Complete
1	Presentation of FNLI.	5	24 November 2006 Ken Peverill	Kyabram Dairy Discussion Group meeting - 35 attendees. They retained a copy of FNLI CD draft.	Became aware of and are keen to access the National Database when possible.	Complete
1	Public access to the BFD web page on the ASRIS website.	5/6	12 June 2007 Raquel Waller	Producers, farm advisers, fertiliser resellers and agents, stakeholders, CMAs, regulatory agencies.		Complete
1	Discussions regarding using ASRIS as a place for the National Database	5/6	3 November 2006	NLWRA, Canberra Blair Wood, Neil	Agreement was finalised to have the database and	Complete

Key Result Area	Activities	Relevant deliverable	Date and deliverer	Target audience	Response/ lesson/aim	Next step
	and FNLI to reside.		Ken Peverill and Ivor Awty	McKenzie and David Jacquier.	FNLI reside on the ASRIS website.	
2	Integration of FNLI into Fertcare® course; collaborative development of presentation slides, pre-course preparation notes and training activities with Gerard Fullarton. Troubleshooting of FNLI compatibility issues.	4	August – September 2006 Alice Melland, Cameron Gourley, Andrew Smith and Kevin Wang	Nutrient MS & Fertcare®.	FNLI now compatible with a broader range of operating systems.	Complete
2	Phone link up with Gerard Fullarton to finetune FNLI program and address Qld coastal deep drainage concerns, and discuss steps to integrate FNLI into Fertcare® course.	4	2 April 2007 Alice Melland Raquel Waller	Gerard Fullarton, Nutrient MS and Fertcare® deliverers	Made improvements to FNLI.	Complete
2	FNLI training delivered through Fertcare®	4/5	September 2006 Gerard Fullerton	Tas Fertcare® level C.	One attendee requested copy of FNLI.	Complete
2	Discussion and training with Wayne Pluske, Nutrient MS, in the use and applicability of FNLI for Fertcare® courses.	4	1 April 2007 Raquel Waller	Wayne Pluske, Nutrient MS and Fertcare® deliverers	Positive response to using FNLI in Fertcare® level C instead of current assessment FESR. Wayne Pluske plans to discuss this with Fertcare® delivery team and update course material.	Complete
2	Provide updates and training of FNLI and National Database.	4/5	6 September 2006 Alice Melland, Ivor Awty, Ken Peverill	8 senior agronomists from IPL.	IPL to internally discuss how to build FNLI into their soil test reporting system. Alan Fletcher to work with Alice/Raquel re integration	Complete

Key Result Area	Activities	Relevant deliverable	Date and deliverer	Target audience	Response/ lesson/aim	Next step
					of FNLI into IPL system.	
2	Discussion with Alan Fletcher, IPL to finalise a program for incorporation of BFD outputs into IPL training programs.	4	15 June 2007 Ivor Awty	IPL staff		Complete
2	Presentation of FNLI and National Database.	4/5	20-21 November 2006 Ken Peverill	WA agronomists from CSBP, Elders, Landmark and consultants accredited to use Nulogic Services (soil and plant testing). Contact person: Barry Ball, Fertiliser Training Manager for CSBP Ltd.	Show a framework for formulating fertilisers that could be adopted throughout the fertiliser industry.	Complete
2	Presentation and discussion of BFD results	4/5	5 June 2007 Raquel Waller Ivor Awty	Impact Victoria		Complete
2	Presentation and discussion of BFD results	4/5	21 June 2007 Ivor Awty	Impact Tasmania		Complete
2	Presentation at FIFA Conference in Canberra.	4/5/7	8 September 2006 Ken Peverill	FIFA members.	Well received presentation. Individual fertiliser companies requesting follow up presentations of the FNLI and National Database.	Complete
3	Trained DPI Gippsland Dryland Nutrient Extension team in use of	3/5	Alice Melland	DPI Gippsland Dryland Nutrient Extension	Assessing, reporting and mapping every paddock is	Complete

Key Result Area	Activities	Relevant deliverable	Date and deliverer	Target audience	Response/ lesson/aim	Next step
	FNLI through seminar, Ellinbank farm survey and informal discussions.				quite time-consuming. DPI extension team to consider how this process can be streamlined.	
3	Training session on BFD results held with NSW DPI.	3/5	24 January 2007 Alice Melland Ivor Awty Raquel Waller	7 NSW DPI including Nigel Phillips and Peter Beale	Positive response to response relationships, database and FNLI.	Complete
3	Discussion of BFD results with Fiona Baker, representative of DPIV Meat and Wool Team	3/5	11 April 2007 Raquel Waller	DPIV Meat and Wool Team (extension team)	Positive feedback to response relationships, database and FNLI.	Complete
3	FNLI used by DPI Extension team in 2006 Tarago Sustainability Project delivery to 8 farmers.	3/5	July 2006-June 2007 Alice Melland Raquel Waller	FNLI users	Addressed feedback to improve usability. Feedback indicated that clients found the program objective, easy to use and useful.	Complete
3	Conducted a week long workshop in Western Australia.	3/5/8	25 to 28 July 2006 Cameron Gourley and Ken Peverill	WA department extension staff, research staff, catchment managers and fertiliser industry advisors.		Complete
3	FIFA conference, speaking role and paper, Hamilton Island.	7/5	Ken Peverill August 2007	Farmers and farm advisors, researchers		Yet to occur
3	Victorian Dairy Conference, presentation on field trip.	7/5	Raquel Waller June 2007	Farmers and farm advisors, researchers		Complete
3	Invited Paper presented to the 'Action on mitigation options for nutrient	7	Dr. Jim Cox, CSIRO Land and	Researchers		Complete

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	reduction in surface and groundwaters' working group meeting, part of the European Cooperation in the field of Scientific and Technical Research (COST) conference 'Localisation of Critical Source Areas in Catchments'.		Water, 22-25 May 2007, Norway.			
3	Interactive display of FNLI program and posters at the combined National EMS in Agriculture and National On Farm Food Safety and Quality Assurance conference, Hobart, August 2007.	7/5	6-10 August 2007 Alice Melland	Farmers and farm advisors, researchers		Yet to occur
3	Grasslands Society of Southern Australia, poster paper.	7/5	13-14 June 2007 Raquel Waller	Farmers and farm advisors, researchers		Complete
3	Grassland Society of NSW, poster paper.	7/5	18-19 July 2007 Nigel Phillips	Farmers and farm advisors, researchers		Yet to occur
3	Presentation of FNLI and National Database.	7	28 November 2006 Ken Peverill	LWA funded project Leaders.	Invited to remain a member of Healthy Soils Group. Have the opportunity to publicise products through Healthy Soils Group.	Complete
3	FNLI Factsheet and poster developed and displayed by MLA at 'NRM Bizarre' RDC and agency conference.	7/5	21 November 2006 Alice Melland/MLA	Regional groups and government.	FNLI Factsheet to be distributed on request.	Complete
3	Article in Australian Soil and Plant Analysis Council Digest.	7/5	July 2007 Ken Peverill	Scientists, industry advisors, agronomists, members of the	To reach as many interested parties as possible.	Complete

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				Council.		
3	Article in MLA Prograzier.	7/5	Spring 2006 Alice Melland	Farmers.	Privacy issue of catchment risk mapping highlighted and actions taken to continue to ensure privacy is maintained.	Complete
3	Article in Australian Dairy Farmer, May 2007	7/5	May 2007	Farmers and farm advisors		Complete
3	Article in How Now Gippy Cow on Olsen P soil test – pasture response relationship.	7/5	June issue 2007 Raquel Waller	Farmers and farm advisors		Complete
3	Article in Weekly Times 'Trial plots dairy nutrient losses', June 2007.	7/5	6 June 2007 Ken Peverill	Farmers and farm advisors		Complete
3	Article in Bestwool/Bestlamb newsletter	7/5	29 June 2007 Raquel Waller	Farmers and farm advisors		Complete
3	Chapter for: Salt, Nutrients, Sediment & Interactions: Findings from the National River Contaminants Program Purpose: To synthesise key findings from the National River Contaminants Program and provide river managers with the latest research and how it can be used to improve management outcomes.	7/5	Published by mid July 2007 Raquel Waller and Brendan Edgar	river managers		Complete
3	3 presentations to CMAs in Victoria.	8/5	4 July 2006 11 August 2006 21 August 2006 Cameron Gourley	Goulburn Broken CMA, West Gippsland CMA, eFarmer reference group.	Increase awareness of project outputs. Develop links with managers to ensure greater utility of the	Complete

Key Result Area	Activities	Relevant deliverable	Date and deliverer	Target audience	Response/ lesson/aim	Next step
			& Alice Melland		BFD products in existing and upcoming projects.	
3	Presentations in Canberra.	8	17-19 July 2006 Alice Melland, Ken Peverill, Cameron Gourley	Land and Water, National Land and Water Resources Audit, Dept of Agriculture Forestry and Fisheries, Australian Greenhouse Office.	Increase awareness of project outputs. Develop links with program managers to ensure greater utility of the BFD products in existing and upcoming projects.	Complete
3	Meet with GippsDairy and address their Water and Environment sub-committee.	8/5	25 September 2006 20 October 2006	GippsDairy- Danielle Auldish, Jeanette Howie. GippsDairy Water and Environment sub- committee.	Brief on the outcomes of BFD and the tech exchange year.	Complete
3	Presentation of BFD results to the GippsDairy board.	8/5	11 December 2006 Ken Peverill			Complete
3	Presentation of FNLI.	8/5	18 October 2006 Ken Peverill, Warwick Dougherty	DIDCO (Regional Dairy Program) (12 members at presentation).	Expressions of willingness to distribute both products for utilisation within dairy communities. Retained a copy of FNLI.	Complete
3	Presentation of BFD outcomes	8/5	4 June 2007 Ken Peverill	Dairy SA Board, Nigel Fleming also attended.	They were very impressed with the response relationships and critical values and FNLI that they believed would prove	Complete

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					valuable in educated the local dairy industries.	
3	Presentation of FNLI.	8/5	29 November 2006 Ken Peverill	Sub Tropical Dairy (Qld Regional Dairy Program) and farmer group.	Alerted to the existence of the FNLI and are very keen to distribute among members.	Complete
3	Hallston LandCare meeting, Presentation including FNLI	8/5	Alice Melland	FNLI users	Interest in using FNLI	Complete
3	Discussion with David Chapman. Meeting with Anne Crawford.	8	4 October 2006 Ken Peverill	David Chapman, Anne Crawford.	Integration of BFD tools into the National Farming Systems projects.	Complete
3	Presentation of BFD outcomes at GipRip River forum on "Managing for Healthy Farms and Waterways" at Tarwin	8/5	10 May 2007 Ken Peverill	60-70 farmers and selected industry reps	Journalists Patrick Francis (National Rural Press and Australian Farm Journal) and Robert White (media for Murray Goulburn Co-op) expressed interest.	Complete
3	Scientific Seminar – FNLI and National Database.	8/1	31 October 2006 Cameron Gourley	Farming Systems Research Meeting, University of Wisconsin and USDA researchers.	Favourable comparisons made between FNLI and other existing Nutrient indices used in the USA.	Complete
3	Scientific Seminar – FNLI and National Database.	8	26 September 2006 Cameron Gourley	USDA Dairy Forage Research Centre, Madison WI.	Request for demonstration of FNLI.	Complete
3	Scientific Seminar – FNLI and National Database.	8	6 September 2006 Cameron Gourley	Soil Science Department, University of Madison, WI.	Interest in approach to nationalise soil test calibrations and recommendations.	Complete

Key Result Area	Activities	Relevant deliverable	Date and deliverer	Target audience	Response/ lesson/aim	Next step
3	Scientific Seminar – BFD project	8	11 June 2007 Cameron Gourley	Farming Systems Research Meeting, Wisconsin USA	Interest in approach to nationalise soil test calibrations and recommendations.	Complete
3	Scientific Seminar – BFD project	8	17 June 2007 Cameron Gourley	SERA-17 meeting University of Arkansas.	Interest in approach to nationalise soil test calibrations and recommendations.	Complete