

National Weeds and Invasive Animals Information Workshop

Report on workshop outcomes

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Executive Summary

Background

Significant investments are increasingly being made in natural resource management (NRM) via Government Programs such as the National Action Plan for Salinity and Water Quality (NAP) and the Natural Heritage Trust (NHT), in addition to various State/Territory, Community and landholder initiatives. Governments at various levels in addition to regional groups and land managers need access to the best available data and information to assist in the decision making process.

The National Monitoring and Evaluation Framework (NM&EF) has been developed by the Australian and State/Territory Governments to facilitate monitoring and reporting on the impact of the NAP and NHT. The NM&EF identifies natural resource topics – Matters for Target – with the aim of assisting the assessment of the effectiveness of various programs. Each ‘Matter for Target’ has a set of Indicators that will be used as the guideline to monitor and report on the topic.

The Invasive Species Matter for Target topic comprises two themes:

- Weeds
- Vertebrate Pests (Invasive Animals)

An important component in achieving a viable Monitoring and Evaluation (M&E) system to report on Weeds and Invasive Animals involves the development of standards and guidelines including the adoption and use of core attributes for surveying and mapping. The National Land & Water Resources Audit in conjunction with theme sponsors (the Department of Agriculture, Fisheries and Forestry, DAFF, and the Department of the Environment and Heritage, DEH) and National Coordinating Committees – (the Vertebrate Pest Committee, VPC and the Australian Weeds Committee, AWC) are currently involved in implementing two work plans dealing with invasive species. Both plans focus on:

- Coordination and National Reporting
- An Analysis of the National Extent, Threats and Impacts – including the development of a set of State/Territory and National Datasets, and updating of distribution information
- Data Infrastructure and Monitoring – including the Identification of National Indicators, the methods and fundamental information needs underpinning these indicators, and the establishment/clarification of national information management arrangements.

This report presents a summary of a National Weeds and Invasive Animals Information Workshop, held at Hadley’s Hotel, March 30-31, 2006.

The goal of the workshop was to gain a consolidated advice in relation to Invasive Species (Weeds and Invasive Animals) Indicators under the NM&EF. The NM&EF identifies:

- The Matter for Target - *Ecologically significant invasive species;*
- The Indicator Heading - *Selected ecologically significant invasive species extent and impact;*

- The Recommended Indicators for Weeds (**Status for Advice**) – 1. *The area and density of weeds under active management, and 2. New incursions of significant weeds; and*
- The Recommended Indicator for Vertebrate Pests (**Status for Advice**) - *Reduction in impact of regionally significant invasive pests (excluding fish).*

Outcomes

The following is a list of actions for weeds:

- The refinements to the Recommended Weeds Indicators be drafted by the National Weeds Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicators within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the preparation of Draft Indicator Protocol documents, prior to submission to the Australian Weeds Committee (AWC).
- Development of a process for selection/ inclusion of weed species, and a final species list for application in the ‘National Weeds Assessment’..
- That the National Weeds Coordinator facilitates the endorsement of the refined Recommended Indicators for Weeds by the Australian Weeds Committee, and ensures AWC advice is incorporated during endorsement.
- That preliminary refinements to the Recommended Indicator Protocols be drafted by the National Weeds Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicator Protocols within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the finalised Indicator Protocol documents for presentation to AWC.
- That the National Weeds Coordinator facilitates the identification and development of various information products suitable to fulfil requirements of the NM&EF. In brief, products need to identify the nature and extent of the problem, what it is effecting (assets) and what is currently being done about it. In addition, to enable complete assessment information is also required on the potential extent of the problem and potential impact. It was noted however, that due to resource constraints only limited data may be available to address impacts.

The following is a list of actions for invasive animals:

- The refinements to the Recommended Invasive Animals Indicators be drafted by the National Invasive Animals Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicators within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the preparation of Draft Indicator Protocol documents. A footnote defining the term ‘significant’ should be included in the refined Recommended Indicator.
- The Invasive Animals Group identified that species selection must be addressed and discussed following the workshop.

- It was decided that Significance Criteria be used to establish the species for consideration under the refined Recommended Indicators. Drafting and agreement of criteria was recommended.
- The Invasive Animals working group needs to clarify the refined recommended Indicator 2 (Impacts) regarding the 'impacts' to be measured, as well as how, where, when, why and in what capacity will measurement occur, and determine whether the Indicator is intended to address reduction in impacts?
- National Invasive Animals Project Coordinator facilitates the endorsement of the refined Recommended Indicators for Pest Animals by the Vertebrate Pest Committee, and ensures VPC advice is incorporated during endorsement. The refined Recommended Indicators be presented to the VPC at the AGM.
- Species significance criteria be drafted and species tested against the criteria for discussion and consideration by VPC.
- The refinements to the Recommended Indicator Protocols be drafted by the National Invasive Animals Project Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicator Protocols within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the finalised Indicator Protocol documents.
- States/ Territories undertake internal process of discussion (involving decision-makers) on Information Needs and Information Products based on the proposed list of information and product matters drafted herein that would be of greatest value to the regional bodies, and the States/ Territories. A consolidated response from Agencies should be presented to the Invasive Animals Working Group.
- A discussion paper addressing all State/Territory responses (consolidated report from discussion on information needs and products) should be prepared and circulated through the Invasive Animals Working Group and for VPC consideration.

The following is a list of actions for both weeds and invasive animals:

- States / Territories identify areas for intensive monitoring of invasive animals and weeds impacts.
- States / Territories should consider existing products that could be used to help identify what products are required, and what components of products are most useful, e.g. land tenure data etc.
- The Project Coordinators should re-address Information Needs and Information Products with the State/ Territories during the proposed State meetings following the workshop.
- Project coordinators to research templates from other themes for potential use with Weeds and Invasive Animals for consideration at State workshops.
- State/ Territory representatives at workshop to discuss data-access and exchange arrangements and the issues surrounding reporting of information to the NLWRA with their respective data managers.

What remains is the need to establish a staged approach to further progress monitoring and evaluation of weeds and invasive animals at a national level, while at the same time providing for the needs of State/ Territories and regions in decision-making regarding the management of weeds and invasive animals.

National coordinators shall visit the States / Territories to:

1. Identify information needs at regional, state and national levels, plus relevant stakeholders for collaboration.
2. Identify what information is potentially available to address the refined Recommended Indicators and associated information needs.
3. Identify information products required by the States/ Territories for their own reporting, whether existing products are available to fulfil National and regional needs.
4. Identify what data is available to address the Recommended Indicators.
5. Address development of compilation standards required for converting state data to nationally consistent data.
6. Discuss data and information access arrangements, data exchange and sharing agreements
7. Identify a timeframe and stages for proposed reporting of existing datasets and a planned approach for ongoing reporting
8. Identify what resources / facilities and support are needed to collate existing data, and develop data in an on-going capacity.
9. Identify gaps in the above process.

Abbreviations

AGM	Annual General Meeting
APCC	Animal and Plant Control Commission (SA)
ARO	Australian Resources Online
AWC	Australian Weeds Committee
BIOSIRT	Biosecurity, Surveillance, Incident Response and Tracing
CRIS	Client Resource Information System
DAFF	Department of Agriculture, Fisheries and Forestry (Federal)
DAWA	Department of Agriculture, Western Australia
DNRM	Department of Natural Resources and Mines
DPIWE	Department of Primary Industries Water and Environment
DSE	Department of Sustainability and Environment
DWLBC	Department of Water, Land and Biodiversity Conservation (SA)
DEH	Department of Environment and Heritage (Federal)
IA CRC	Invasive Animals Cooperative Research Centre
IPMS	Integrated Pest Management Information System
MER	Monitoring, Evaluation and Reporting
NCC	National Coordination Committee (e.g AWC and VPC)
NIMTG	National Information Managers Technical Group
NLWRA	National Land & Water Resources Audit or the Audit
NM&EF	National Natural Monitoring and Evaluation Framework
NRM	Natural Resource Management
NRMMC	Natural Resource Management Ministerial Council
PAIS	Pest Animal Information System
PESTINFO	PestInfo V4.2 Software
PEST 2000+	Pest 2000+ information system
PIRSA	Primary Industries and Resources SA
RLPB	Rural Lands Protection Boards
RMP	Resource Management Package
SQCR	Surveillance, Quarantine, Control and Recovery
VPC	Vertebrate Pest Committee
WONS	Weeds of National Significance

1. Introduction

1.1 Background and Purpose

The National Land and Water Resources Audit (NLWRA or the Audit) was established under the Natural Heritage Trust Act in order to provide a baseline to assess the effectiveness of land and water degradation policies and programs, and to improve Australian Government, State, Territory and Regional decision-making on natural resource management.

A key focus of the Audit involves the identification of natural resource management priorities (e.g. monitoring and evaluation co-ordination, condition and trend assessment processes), and the progressing of systems that enable the assessment of investments and information on the nation's natural resources. A major emphasis is on development of information products generated via linked information management systems providing access to up-to-date information.

As part of its core activities, the Audit is facilitating the process of developing a framework for the consistent collection, collation and analysis of natural resource data and information across Australia.

Australian, State and Territory governments and communities are investing considerable resources in weed and invasive animal management throughout the country. Government investment is being directed through various programs, such as the Natural Heritage Trust with emphasis on regional Natural Resource Management (NRM) bodies. Reliable information is vital to ensure that investment is directed to the areas of highest priority, and to assess whether these investment initiatives are making a difference to the status and impacts of weeds and invasive animals throughout Australia. This is particularly pertinent for policy development at the national and state scale, and for decision making at the regional and local scale.

The National Monitoring and Evaluation Framework (NM&EF) - established by the State, Territory and Australian Governments - aims to help assess the health of the nation's land, water and biological resources; and, the performance of Government programs, strategies and policies. The NM&EF identifies natural resource topics – Matters for Target – to collect and manage information on natural resource condition in Australia. Each Matter for Target has a set of Indicators to be used as the guidelines to monitor and report. The National Land & Water Resources Audit's responsibilities in relation to the NM&EF include:

- Collecting information under the NM&EF.
- Coordinating projects and information collection at a national scale.
- Determining data and information needs.
- Engaging national coordination committees.
- Developing standardised natural resource products and reporting across all jurisdictions.

In relation to Invasive Species (Weeds and Invasive Animals) the NM&EF identifies:

- The Matter for Target - *Ecologically significant invasive species*;
- The Indicator Heading - *Selected ecologically significant invasive species extent and impact*;
- The Recommended Indicators for Weeds (**Status for Advice**) – 1. *The area and density of weeds under active management, and 2. New incursions of significant weeds; and*

- The Recommended Indicator for Vertebrate Pests (**Status for Advice**) - *Reduction in impact of regionally significant invasive pests (excluding fish).*

The National Weeds and Invasive Animals Information Workshop was convened to resolve priorities for weeds and invasive animals information management, address national indicators and information needs, and further develop information products and information management arrangements.

It was highlighted that the development of indicators, indicator protocols and methodology, products and information management requires agreement and endorsement. The process involves:

- The National Coordination Committee (I.e. the Australian Weeds Committee, AWC and Vertebrate Pest Committee, VPC in the case of weeds and invasive animals) to recommend the Indicators of Resource Condition, Protocol / Methodology statements, Products and Information Systems.
- The Audit Advisory Council to endorse the Indicators and subsequent protocols.
- The Natural Resource Management Ministerial Council to agree that the Indicators and subsequent protocols fulfil national reporting requirements.

1.2 Workshop Objectives and Structure

The workshop objectives were to:

- (1) Review current indicators, and associated methodological statements and seek endorsement / agreement on the Indicators under the National Monitoring and Evaluating Framework so that they can be presented to the Audit Advisory Council for endorsement.
- (2) Identify and agree on what fundamental data / information is required to report on the national indicators.
- (3) Reach agreement on an appropriate national information management system(s), including developing on-going State/Territory arrangements for the collation and supply of data.

The workshop was structured around 4 themes (priorities) for the management of weeds and invasive animal's information throughout Australia. These were:

- National Monitoring and Evaluation Framework (NM&EF),
- Indicator Protocols / Methodology,
- Information Products, and
- Data and Information Management

A copy of the workshop Agenda and program is given as Appendix 1.

1.3 Participants Expectations

As part of the workshop introductory session, participants indicated their expectations for the workshop and national programs for collection, collation and reporting of national weeds and invasive animal's information. The stated expectations of participants regarding the workshop were:

Goals and objectives

- The need for clarity in what the Audit needs in order to fulfil its reporting needs, and that an agreement is reached with jurisdictions in supplying data as part of this process.
- Participants are clear on what the workshop is attempting, and the critical questions being addressed
- Both short and long-term goals are identified and must be achievable.
- Goals should include working with current systems and their capabilities to create a national system that is flexible to all needs at all scales.

Program / management

- Programs have sufficient flexibility to cater for jurisdictional needs and processes
- Consideration is given to quantifying local level benefits to agriculture and nature conservation as part of monitoring programs.
- There is understanding and agreement to a process after the workshop
- Clarity is required on the roles and responsibilities for data and information management, providing a stronger basis for sound investment in natural resource management, thereby adding strength to strategies arguing for increased investment.
- Existing funding deficiencies are recognised impediments to many program.
- Importance of being realistic regarding programs in attracting much needed funding.
- It is vital to establish what the States / Territories require regarding funding, coordination and input.
- Costs to the States in fulfilling national level reporting requirements are minimised and where appropriate cost-sharing agreements are established.

Data and information systems

- The importance of good data collection and collation is recognised, and that the costs of collection must be offset by the benefits.
- Clarity is reached on the purpose of invasive species information systems, whether a single national information system or multiple State/Territory information systems are most suitable. It was stressed that there is little value in having 56 different information systems.
- That development of an enduring system / framework caters for evolving needs. Refinement will be possible when existing system/s act as building blocks, however there is a need to get things 'right' first time round.
- If adopted, a national system/s needs to have enough flexibility to enable connectivity between new and established systems in and across all States/ Territories
- A trial of any system/s that are adopted would verify their usefulness.

Methods and protocols

- Monitoring resource condition must address a range of time-scales, not just long-time frames.

Outcomes and products

- Applicable and practical outcomes are reached that are relevant at all scales (national, state, regional, and local).
- The product/s have recognised high-value to users and are meaningful to ensure longevity.
- Program activities need to be needs-driven not data-driven.
- Net benefits of the programs to the control of invasive species needs to be considered.
- Communicating the case and direction for sound investment is vital.

The workshop participants indicated their expectations of the recommended national Indicators and methods for monitoring regarding weeds and invasive animals. They were that:

- The proposed national indicators are intended to be used to reflect change in the status of invasive species. To be successful they need to be practical at all levels and capable of being used to assess the effectiveness of national programs.

- Clarity is reached regarding what the Indicators will be used for and the levels / scales at which they are most relevant. I.e. it might be that different indicators are required for different scales.
- The immediate and on-going costs from the recommended monitoring activities are identified.
- Progress on the Weeds of National Significance (WONS), WONS rationale and the recommended Weed Core Attributes are valuable for the Indicators.
- Consensus is reached regarding the process of endorsement of Indicators addressed at the workshop.
- Targets associated with Indicators are unyielding and not like moving goal-posts.
- Collection of information against the Indicators must be straight forward and practical to ensure longevity.
- Monitoring methods / protocol are sensitive and robust enough to measure change, and that measured change is meaningful.
- Measuring change in impacts in response to management can provide insight into the consequences of no active management over time.
- Surrogates of impact are fully explored / verified via trials and pilots.

1.4 National Weeds and Invasive Animals Work Plans

The National Weeds Assessment and National Invasive Animals Work Plan are being coordinated simultaneously. The implementation of the work plans encompasses five phases: Process of scoping; Work plan development and endorsement; State and Territory jurisdictional meetings; Staging of National information workshop, and compilation of jurisdictional datasets and development of information and reporting products.

Successful implementation of both Work Plans requires participation and joint ownership from all States and Territories to establish and maintain effective institutional coordination and reporting for the delivery of sub-projects under the Work Plans.

The National Weeds and Invasive Animals Work Plans focus on:

- Coordination and National Reporting.
- Analysis of the National Extent, Threats and Impacts – including the development of a set of State/Territory and National Datasets, and updating of distribution information.
- Data Infrastructure and Monitoring – including the Identification of National Indicators, the methods and fundamental information needs underpinning these indicators, and the establishment/clarification of national information management arrangements.

The National workshop represents the fourth phase. Key issues highlighted regarding the National Weeds Assessment and National Invasive Animals Work Program were that:

- Australian Government is responsible for national coordination for implementation of programs.
- The intention is to build on existing systems but acceptance of some change may be necessary
- Programs are looking to build the architecture and data infrastructure to support decision making.
- The goals of the programs are ambitious but well supported by Jurisdictions, the Australian Government and respective National Coordinating Committees i.e. Australian Weeds Committee (AWC) and Vertebrate Pest Committee (VPC).

The remaining phase of the projects address compilation of jurisdictional datasets, collation and development of information products to fulfil weeds and invasive animals information reporting requirements. This will involve State/ Territory based meetings to identify information to address the monitoring and reporting requirements, resources needed to facilitate reporting, and mechanisms to collect, collate and deliver information in an on-going capacity.

1.5 Monitoring and Evaluation

Monitoring and evaluation are vital to effectively manage weeds and invasive animals in Australia. Monitoring, Evaluation and Reporting (MER) is about identifying and collecting information to help determine if actions are producing desired results. Monitoring allows the identification of what actions work and what direction to follow, how to improve actions (particularly where they are ineffective), and how to make changes to reach desired goals.

Monitoring, Evaluation and Reporting are required to establish whether changes in resource condition have resulted from management actions. They are also vital at the local and regional level to identify control priorities and allow communities to initiate and practice sound management.

Sound information is needed to ensure that investment (national, state and regional levels) is directed to the areas of highest priority, and to assess what sort of difference the investment is making. This is the case at the national and state scale where information is required to help make policy decisions and at the regional and local scale where resource managers need good information to help make the best management decisions.

1.6 Information Needs – Overview

Critical to the process of natural resource management is the identification of information products needed to meet current and on-going management requirements. The workshop was intended to gain broad consensus on what is occurring at a national level regarding information of most value to effectively manage weeds and invasive animals. The workshop was also intended to identify what steps are required to move forward to meet on-going information needs.

Role of the NLWRA

Blair Wood (NLWRA) welcomed participants and addressed issues raised by the workshop participants, to clarify the purpose of national indicators of resource condition, information products and data infrastructure to support long-term management needs.

Blair outlined challenges in managing information relevant to natural resource management, monitoring, evaluation and reporting of management, matters for target, and assessment of resource condition across 56 regions, 8 State/ Territories, and a National level. He proposed the challenge of determining how information should be collected that will remain useful at all levels, and whether information should be managed within a single information system or multiple systems.

He described the Audit's role and responsibilities regarding the National Monitoring and Evaluation Frameworks (NM&EF) Matters for Target, and Indicators of Resource Condition and Change. The Audits responsibilities primarily include:

- Collecting information against the NM&EF
- Coordinating projects and information collection to support national level assessment

- Determining data and information needs
- Engaging national coordination committees
- Developing standardised natural resource reporting across all jurisdictions

He stressed that outputs must be relevant at the scale at which decisions are made, and that the roles and responsibilities of Agency's are becoming clearer regarding data collection, collation and reporting.

Blair outlined the 3 stages of Indicator development and agreement:

- 1) The National Coordination Committee (NCC) recommends the Indicators of Resource Condition, Protocol / methodology statements, Products and Information systems;
- 2) The NLWRA Advisory Council endorses the Indicators and associated stages
- 3) The Natural Resource Management Ministerial Council (NRMMC), agrees that the Indicators and stages meet national reporting requirements.

The Audit seeks to build and enduring infrastructure, and that the aim of these current programs is to populate the infrastructure.

Workshop participants voiced their concerns that agreement on the strategy of obtaining information, the enduring process of information management, and associated information system/s must be based on the following a) sound policy, b) politically sound, and c) technical robust.

Natural Resource Management regional needs and Monitoring, Evaluation and Reporting

Mike Grundy (Queensland, Department of NRM) addressed the workshop to provide an overview of how regional NRM organisations address resource management priorities. Mike indicated that planning and NRM often involves many regional bodies, and that a strategic view at regional level is required. He explained that regions invest in management actions they consider 'appropriate', but that outcomes from investment must be measured against 'resource condition targets'. Mike stressed that any national strategy must deliver outcomes to the regions, and proposed the question: How realistic is it to measure the impacts of weeds and invasive animals?" I.e. is it achievable and do the costs justify the benefits.

Mike also outlined the issues for Monitoring, Evaluation and Reporting at the regional level and indicated that refinements to the current Indicators for weeds and invasive animals should be undertaken at the current workshop.

1.7 Information Products – Overview

The delivery of timely and accurate information is a critical step in support of decision-makers in the management of weeds and invasive animals throughout Australia. Peter Wilson (NLWRA) provided an introduction to information products to initiate the next stage of indicator development: determining how to provide information into a decision making and planning framework.

Peter presented the following key points:

- NLWRA Framework is attempting to assess the health, condition, and changes in natural resources, while assessing the effectiveness of management and investment programs throughout Australia.
- Products are the results of the final stage in the lengthy process
- Indicators (what to measure) lead to Protocols (how to measure it) that lead to Products and Information management.
- It is important to decide what products will be useful for national reporting against the Matters for Target.
- Although there are significant gaps in current information, similar situations exist regarding information under other Themes, and it is important to recognise that collation of existing information in the short term is still valuable.
- Product standards need to be identified and agreed upon.
- States/ Territories could produce a standardised process for developing products.
- Products must be detailed enough to provide accurate and meaningful information at the regional level, and all levels above that.
- An adaptive management approach is required to build on previous information systems.
- Harnessing intellectual knowledge of experts throughout various natural resource disciplines to meet information reporting needs is often difficult, but contributions from the States/ Territories are highly valued.
- Changes in mapping technology and the formats of information can lead to perceived changes in the condition of resources, even if real changes have not occurred.
- Defining reporting and information standards can overcome these problems with information reporting and products.
- Shortfalls in some national maps of resources relate to the fact that they have been generated from a collation of independent mapping initiatives at the State-level, which are often varying in scale and level of detail.
- National projections of resource condition may vary from State-level datasets triggering some confusion in interpretation.
- National products should be agreed to by the States/ Territories. However, if regional level products can be agreed to, they will improve the quality and accuracy of state and national-scale products.
- There are many spatial zones or regions for reporting information. For example, State-level, NRM regions, IBRA regions and subregions, and Catchment regions. A decision about which zone/ region type is most appropriate for the region and national perspective is urgently required.
- To ensure longevity and meaningfulness of the Indicators, five practical steps were recommended:
 - Define information products of greatest value;
 - Develop specifications / standards for developing products;
 - Develop national database (either central or distributive) to prepare examples of national products;
 - States deliver from their own systems; and
 - Collation of products through the Australian Resources On-line (ARO).

Following the above presentation an open discussion was held to address issues relevant to Information Products in light of Peter Wilson's presentation.

Key issues raised in discussion regarding information products included:

- The need to identify products of greatest value to decision-makers, and the preparation of a consolidated viewpoint from each State/ Territory.
- The importance of maintaining data quality during the process of collating information for reporting. Products containing real information are needed for informed decision-making. Hence, there is a need to engage decision-makers in the process of developing desirable products.
- Demand, rather than supply should guide product delivery. I.e. identification and development of products that are needed c.f. products that existing datasets can deliver? Demands are more sophisticated and targeted than previously, and the goal should be to develop an infrastructure that can produce different types of products to address increasingly sophisticated questions.
- There are different information needs at differing levels (local, regional, state and national), however, identification of information needs and engagement of decision-makers in the process is imperative to delivering, and subsequently improving information products for the various levels of management.
- The group agreed that addressing information needs and information products at all levels is essential to the success of this process. Furthermore, it is vital that methods for measuring information, and ways of measuring effectiveness of information are considered.
- Powerful products could include potential distribution of species. The current versus potential range of species could be highly valuable.
- The Audit emphasised that the fundamental questions are:
 - How do we measure success?
 - Do we have the products that can influence decisions?
 - How do we reduce impacts at a regional level? What information do we need to demonstrate effectiveness of programs at differing levels?
 - How do we reduce impacts at a State-level and what information is required to demonstrate effectiveness of programs at a State or at a multi-regional level?
 - At national level, what does the Australian Government collectively require to enable it to make decisions?
- Providing products can facilitate great interest and discussion for improvements / refinements, but the challenge is to identify priorities for products, and test them with decision-makers to ensure they satisfy their requirements.
- The trial of products with hypothetical (or partial datasets) would encourage a response from people (both negative and positive) allowing improved product development.
- There are many forms of information products, such as maps well-chosen text, tables, charts and graphs, and time series animations etc.
- Monitoring, Mapping and Modelling are three elements to consider in these programs.
- Products may also vary depending on whether species are well-established or emerging.
- Products must be able to be produced without the aid of the Audit in the long-term.

Peter Wilson clarified that we are building a framework and testing capacity to address information needs, prepare products and test products for decision-making. Peter presented an example to indicate that the States are capable of building products that are useful to regional management.

Breakout Session Groups

Workshop participants formed two break-out groups to address the Weeds and Vertebrate Pest matters respectively (referred to hereafter as Weeds Group and Invasive Animals Group).

2. WEEDS

2.1 Information Needs

2.1.1 Weeds Information Needs

It was noted that the workshop aims to identify national, state/ territory and regional information needs. To this end, an open forum discussion was held to identify the key questions the Indicators seek to address, and the issues that relate to those questions.

Issues that relate to these questions as identified by workshop participants included:

- The need for a commonly understood language for monitoring, evaluation and reporting weed activities.
- Baseline information may currently be lacking for many weeds.
- A concern whether the impacts of weeds can be sufficiently measured and monitored for evaluation?
- Can monitoring be statistically meaningful, and should statistical advice be sought?
- Can modelling of broad trends assist monitoring and evaluation where data cannot be collected?
- Can the likely outcomes from 'no management' be identified, possibly through modelling?
- Both density and impact information serve to provide valuable information for the management of weeds – including a basis on which to evaluate programs and develop new mitigation actions / programs.
- Can case studies in selected areas address some of the monitoring and evaluation requirements, namely, direct measurement of impact?
- New incursions may present a measure of management effectiveness; however, the number of new incursions for weeds is generally higher than that of vertebrate pests.
- A nested approach may be a suitable to define 'new incursions' at 4 levels: local, regional, state and national.

2.1.2 National Resource Condition Indicator/s Advice

The workshop moved to address the current Recommended Indicators (Status: for advice). This involved giving consideration to the following

- the national monitoring and evaluation framework,
- the key questions the Indicators seek to address,
- the issues that relate to those questions, and their terminology.

As an additional guideline for this session, Greg Pinkard (DPIWE and member of Audit Advisory Council) highlighted that the Indicators serve to provide information to help decision making at all levels.

The Weeds Group was asked to:

- examine the current Recommended Indicator/s,

- determine the suitability of the Recommended Indicator/s to address the information needs of the regions, States/ Territories and National NM&EF,
- determine if the Indicators complement objectives of the National Weeds Strategy,
- If considered appropriate propose changes to the Recommended Indicator/s, and
- provide rationale for any proposed changes.

It was emphasised that the purpose of this stage of the workshop was to provide advice on the current Recommended Indicators.

The Weeds Group discussed the current Recommended Indicators and their suitability.

Issues of concern included:

- 1) Selection of species – Over 100 species were initially selected for consideration under the Indicators. In order to reduce the number of species for which monitoring would be undertaken, it was suggested that regions nominate species relevant their area of interest (Jurisdiction). Based on this information further consultation will be held to refine a list for consideration in the National Weeds Assessment. In this respect the current Weeds of National Significance (WONS), WONS Candidate List, and other various lists e.g. Alert List, Sleeper List and lists developed by jurisdictions as part of control and management activities will be taken into consideration. It was agreed that reporting on species that are unknown was equally important.
- 2) Predictions – The potential maximum extent and potential impact were considered important in the refinement of the indicator due to their value to management.

The Indicator Heading for Weeds is: *THE EXTENT AND IMPACT OF SELECTED SIGNIFICANT INVASIVE VEGETATION SPECIES.*

The Recommended Indicators for Weeds are:

1. *The area and density of weeds under active management*
2. *New incursions of significant weeds*

The Weeds Group agreed that Recommended Indicators for Weeds incorporate the following changes:

1. *Extent, density and distribution of weeds*
2. *Impact on assets**
3. *Potential maximum extent (proposed for discussion)*
4. *Potential impacts on assets (proposed for discussion)*
5. *The Extent of Active Management (proposed for discussion)*

Note*: Biodiversity, environment, production, service, goods or value based.

Rationale

The refined recommended Indicators were selected to address five fundamental questions regarding weeds in Australia:

- 1) How big is the problem?
- 2) What is it affecting?

- 3) What is being done about it?
- 4) How big could the problem get?
- 5) What would be the potential impact?

It was recommended that a decision be made regarding the selection/ inclusion of species and a final species list be developed for consideration as part of the refinement of Recommended Indicators. Concern at including approximately 100 species was discussed, with support for some process to develop a reduced number.

Actions arising

Refinements to the Recommended Indicators are to be drafted by the National Weeds Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States / Territories will then distribute the Indicators within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the preparation of Draft Indicator Protocol documents.

Decision reached regarding the process of selection/ inclusion of species, and a final species list.

2.1.3 Endorsement of Indicators

The refined Recommended Indicators require endorsement.

The Australian Weeds Committee (AWC) will be asked to formally endorse the refined Indicators for weeds and to recommend the refined indicators under the National Monitoring and Evaluation Framework (NM&EF) to the National Land & Water Resources Audit Advisory Council in replacement of the existing Indicator.

Actions arising

That the National Weeds Assessment Coordinator facilitates the development and endorsement of the refined Recommended Indicators for Weeds by the Australian Weeds Committee, and ensures AWC advice is incorporated during endorsement – via the AWC Sub-committee.

2.2 Information Collection and Collation Protocol

2.2.1 Refined Protocol for National Weeds

As an introduction to methods for collecting, collating, and reporting information on weeds and invasive animals, Richard Thackway (Australian Government, DAFF) and Peter West (IA CRC) presented on methods for monitoring weeds and invasive animals throughout Australia.

Richard highlighted the need for a standardised approach and standardised protocols for monitoring, such as the ‘field manual for surveying and mapping nationally significant weeds’. Richard proposed the question: how do you develop a system to measure or monitor for selected Indicators? He suggested a range of issues for consideration in monitoring of weeds. They included:

- targeting where monitoring is intended, and who is involved in monitoring.
- identify points of spread/ incursion of species, and pathways of spread.
- identify social, environmental and economic impacts.

- ensure accurate species identification and consider behaviour and life history of species.
- ensure core attributes are identified and measured, but limit the number of core attributes to increase data quality.
- obtain information on absence of species.
- monitoring after management is essential, and must occur independent of land tenure.
- ensure flexibility to allow additions/ refinements/ altered responsibilities.
- robust field manual is essential as support material.
- usable end product is essential, and systems must be fit for purpose.
- agreements on cost sharing for development and maintenance.

The Weeds Group was asked to address the next state of Indicator development: the protocol / methods for measuring information against the Recommended Indicators. The Group was asked to refer to existing or draft field manuals for monitoring, and review the existing Indicator Protocol documents in light of refinements to the Recommended Indicators. The Group was asked to identify priority steps required to update the Indicator Protocols. The Weeds Group was also asked to provide advice on the Indicator Protocol documents given proposed changes to the Recommended Indicators.

Advice on proposed weeds protocols

The Weeds Group reviewed the existing Indicator Protocols and various subject headings and discussed the suitability of the Protocols to support the refined Recommended Indicators.

Recommendations for protocols

The group indicated that there is considerable useful material for inclusion in the new protocols. They subsequently recommended that new Draft Indicator Protocol documents be prepared to match the refined Recommended Indicators. It was further agreed that some form of procedure was required in order to identify species for consideration in the National Weeds Assessment and that this work could commence out-of-session.

Actions arising

The refinements to the Recommended Indicator Protocols be drafted by the National Weeds Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicator Protocols within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the finalised Indicator Protocol documents.

Consideration to be given to developing a process for species selection and methods for assessing current and potential impact. The draft NM&EF template is to be used as a basis for developing the revised protocol documents. Emphasis needs to be given to the issue of data quality, compilation standards and data access/exchange agreements. In this respect the work of ANZLIC and existing NRM data coordinators at state / territory level should be referred to.

2.3 Information Products

2.3.1 Information Products to Support Information Needs

The Weeds Group was asked to address the next state of Indicator development: determining the information and products of greatest value to management at various levels.

Advice on Products

The Weeds Group reviewed the refined Recommended Indicators from earlier sessions, and proposed the following key issues that the Indicators were intended to answer:

- How large is the current problem/s?
- How large could the problem/s become?
- Is the problem/s expanding or contracting and at what rate?
- What and who is the problem/s affecting?
- What is being done to address the problem/s?
- What could be the potential impacts associated with the problem/s?

Products proposed to address the Indicator and the above key issues were products that:

- Show the distribution, extent and density of weeds;
- Identify significant assets and products related to management actions and the result of management in relation to specific outcomes;
- Report new incursion locations;
- Report potential case studies;
- Use text and graphics (not just maps) to report temporal trends (in varied formats).
- Are aimed at all the different levels (regional, state, national).

The Weeds Group also identified that some confusion surrounded the wording of the Indicator Heading and the Matter for Target that may require some discussion after the workshop.

Recommendations for Products

It was recognised that information needs should drive the process of determining information products, and that the most valuable products are those that influence management decisions at the ground level, while providing necessary information for higher-end users.

The need for data and information infrastructure to support the development of information products was identified.

In order to further the development of information products it was identified that a poster presentation illustrating various products at differing levels may be useful.

Actions arising

States and Territories to undertake internal consultation on Information Needs and Information Products. The issue will be further discussed as part of the up-coming round of jurisdictional workshops. Following this process a discussion paper is to be developed for consideration by the AWC sub-committee for final consideration by AWC.

States and Territories to give consideration to existing products that could be used to help identify products required to fulfil reporting requirements under the NM&EF and proposed new indicators.

3. INVASIVE ANIMALS

3.1 Information Needs

3.1.1 *Invasive Animal Information Needs*

It was noted that the workshop aims to identify national, state/ territory and regional information needs. To this end, an open forum discussion was held to identify the key questions the Indicators seek to address, and the issues that relate to those questions.

Issues that relate to these questions as identified by workshop participants included:

- The need for a commonly understood language for monitoring, evaluation and reporting invasive animal activities
- Baseline information may currently be lacking for many invasive animals
- A concern whether the impacts of invasive animals can be sufficiently measured and monitored for evaluation?
- Can monitoring be statistically meaningful, and should statistical advice be sought?
- Can modelling of broad trends assist monitoring and evaluation where data cannot be collected?
- Can the likely outcomes from 'no management' be identified, possibly through modelling?
- Both density and impact information serve to provide valuable information for the management of vertebrate pests – including a basis on which to evaluate programs and develop new mitigation actions / programs
- Can case studies in selected areas address some of the monitoring and evaluation requirements, namely, direct measurement of impact?
- New incursions may present a measure of management effectiveness; however, the number of new incursions for vertebrate pests is generally lower than that of weeds
- A nested approach may be a suitable to define 'new incursions' at 4 levels: local, regional, state and national

3.1.2 *National Resource Condition Indicator/s Advice*

The workshop moved to address the current Recommended Indicators (Status: for advice). This involved giving consideration to the following

- the national monitoring and evaluation framework,
- the key questions the Indicators seek to address,
- the issues that relate to those questions, and their terminology.

As an additional guideline for this session, Greg Pinkard (DPIWE and member of NLWRA Advisory Council) highlighted that the Indicators serve to provide information to help decision making at all levels.

The Invasive Animals Group was asked to:

- examine the current Recommended Indicator/s,
- determine the suitability of the Recommended Indicator/s to address the information needs of the regions, States/ Territories and National NM&EF,

- determine if the Indicators complement objectives of the National Pest Animals Strategy,
- If considered appropriate propose changes to the Recommended Indicator/s, and
- provide rationale for any proposed changes.

It was emphasised that the purpose of this stage of the workshop was to provide advice on the current Recommended Indicators.

The Invasive Animals Group discussed the current Recommended Indicators and their suitability.

Issues of concern included:

- 1) Selection of species – It was unclear which species were to be considered under the Recommended Indicators. Thus, a decision was required on this matter.
- 2) Indicator terminology – The terms ‘regionally’ and ‘significant’ posed some confusion.
- 3) New Incursions / Emergent Species – There was uncertainty whether new incursions required a separate Indicator.

The Indicator Heading for Vertebrate Pests is: *THE EXTENT AND IMPACT OF SELECTED ECOLOGICALLY SIGNIFICANT INVASIVE SPECIES.*

The Recommended Indicator for pest animals was:

1. *Impacts of regionally significant invasive vertebrate pests, excluding fish.*

The Invasive Animals Group agreed that Recommended Indicators for Invasive Animals incorporate the following changes:

1. *Distribution and abundance of significant invasive vertebrate pests*
2. *Impacts of significant invasive vertebrate pests.*

Rationale

The proposed changes to the Recommended Indicators were determined to improve the quality of reporting of the status of invasive animals and their impacts.

Species Selection and Significance Criteria – It was suggested that species considered under the National Indicators should be determined using criteria. It was noted that significance criteria may be adopted / refined from work in progress by the Australian Biosecurity System Task Force. The Invasive Animals Group suggested issues to consider in the development of criteria for species inclusion, namely: current and potential distribution of species, introduced versus native, response behaviour (eruptive), taxonomic groups, potential for impact (triple bottom line), invasiveness, contribution to management, and existing plans.

It was proposed that 2 species lists may be prepared to address the 2 refined Recommended Indicators, and that species lists could evolve depending on priorities. In the interim, it was discussed whether a core list of 5-10 species could be considered as a trial list.

Indicators – The proposed Indicators were identified to complement each other, providing a combination of distribution and abundance (measured at a broad-scale) and impacts (measured at selected areas at localised scale), for reporting trends in species population abundance and reporting trends in species impact/s respectively.

Indicator 1 – It was suggested that it is intended for monitoring broad-scale trends in the distribution and abundance of vertebrate pests to support broad assessments of program

effectiveness. It is intended to report broad-scale trends in well-established species while allowing newly established, emerging and new inclusions of species to be simultaneously detected and reported. New Incursions / Emergent species would be considered under Indicator 1, because of the need to prevent establishment.

Indicator 2 – It was suggested that it is intended for intensive monitoring of vertebrate pest impacts (quantitative or qualitative measures of social, environmental or economic consequences of a species) at small-scale targeted areas, where broad-scale information on impacts is not obtainable. It is intended that Indicator 2 provides high-quality impact information to report trends in the impacts of well-established or newly-established vertebrate pest species at numerous targeted areas throughout the range of a species. Clarity on the types of impacts measured was recommended. Distribution may be an attribute considered in monitoring against Indicator 2.

Species selection will be discussed under *Information Collection and Collation Protocol*.

Actions arising

The Invasive Animals Group identified that species selection must be addressed and discussed following the workshop.

It was decided that Significance Criteria be used to establish the species for consideration under the refined Recommended Indicators. Drafting and agreement of criteria was recommended.

The refinements to the Recommended Indicators be drafted by the National Invasive Animals Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicators within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the preparation of Draft Indicator Protocol documents. A footnote defining the term 'significant' should be included in the refined Recommended Indicator.

The Invasive Animals working group needs to clarify the refined recommended Indicator 2 (Impacts) regarding the 'impacts' to be measured, as well as how, where, when, why and in what capacity will measurement occur. Is the Indicator intended to address reduction in impacts?

3.1.3 Endorsement of Indicators

The refined Recommended Indicators require endorsement.

The Australian Vertebrate Pest Committee (VPC) will be asked to formally endorse the refined Indicators for vertebrate pests and to recommend the refined indicators under the National Monitoring and Evaluation Framework (NM&EF) to the National Land & Water Resources Audit Advisory Council in replacement of the existing Indicator. The VPC will be approached with these recommendations from the VPC Indicators Working Group.

It was recommended that the refined Recommended Indicators be addressed at the VPC Annual General Meeting in May, 2006.

Actions arising

National Invasive Animals Project Coordinator facilitates the endorsement of the refined Recommended Indicators for Pest Animals by the Vertebrate Pest Committee, and ensures VPC advice is incorporated during endorsement.

The refined Recommended Indicators be presented to the VPC at the AGM.

3.2 Information Collection and Collation Protocol

3.2.1 Refined Protocol for National Invasive Animals

As an introduction to methods for collecting, collating, and reporting information on weeds and invasive animals, Richard Thackway (Australian Government, DAFF) and Peter West (IA CRC) presented on methods for monitoring weeds and invasive animals throughout Australia.

Peter West delivered a presentation on the current initiatives to gather information on the distribution and abundance of invasive animals throughout the States/ Territories of Australia. Similarities in approaches previously taken by State Agencies, as well as differences that exist in the outputs of previous monitoring programs were highlighted. Similarities exist regarding the qualitative methods implemented to report the distribution and abundance of invasive animals. Differences exist in the species surveyed, reporting scale, and timeframe and currency of existing information.

It was indicated that there were no formal nationally agreed core attributes for invasive animals, but was recommended that consistency in monitoring, through the adoption of the National Pest Animal Monitoring Manuals (currently in draft through NSW DPI) would provide improved data on invasive animal distribution, abundance, and impacts.

It was also noted that collection of high-quality and meaningful field data is imperative to maintain accuracy of regional, state and national reporting frameworks.

The Invasive Animals Group was asked to address the next state of Indicator development: the protocol / methods for measuring information against the Recommended Indicators. The Group was asked to refer to existing or draft field manuals for monitoring, and review the existing Indicator Protocol documents in light of refinements to the Recommended Indicators. The Group was asked to identify priority steps required to update the Indicator Protocols. The Invasive Animals Group was also asked to provide advice on the Indicator Protocol documents given proposed changes to the Recommended Indicators.

Advice on proposed invasive animals protocols

The Invasive Animals Group reviewed the existing Indicator Protocol and subject headings, and discussed the suitability of the Protocols to the refined Recommended Indicators.

Recommendations for protocols

The former Recommended Indicator specified that density (abundance of invasive animals) has often been used as a measure of invasive animal impact. The refined Recommended Indicators specify that distribution and abundance information alone provides valuable information for

monitoring invasive animal populations. Thus, it was suggested that the Indicator Protocol reflect this.

It was also recommended that the refined Recommended Indicators require individual Indicator Protocol documents but should be used congruently. It was proposed that broad-scale monitoring of distribution and abundance (Indicator 1) should be used to complement fine-scale monitoring of impacts (Indicator 2).

The Invasive Animals Group recommended:

- Species considered under the refined Recommended Indicators should be determined using Significance Criteria (as described above).
- Species significance criteria should be drafted and species tested against the criteria for discussion with stakeholders.
- Separate draft Indicator Protocol documents should be prepared to match the two refined Recommended Indicators.
- Existing State / Territory monitoring programs should be considered in the drafting of the Indicator Protocol.
- The functionality of core attributes for monitoring invasive animals should be assessed. Core attributes may be suitable for functional groups of species (i.e, taxonomic groups).
- Broad-scale monitoring is applicable to Indicator 1 (distribution and abundance).
- Intensive monitoring of selected areas is applicable to indicator 2 (impacts), and may involve modelling of impacts, validation of impacts, targeted investigations and an asset based approach to impact monitoring.
- Monitoring sites for Indicator 2 should encompass a range of species, geographic areas, and impact types. Information from established monitoring of impacts should be incorporated where feasible, such as IA CRC demonstration sites. However, some new sites for monitoring impacts may be required to address Indicator 2, to fill gaps between existing monitoring programs.
- A number of data layers could be used to report on changes in the impact of invasive animals
- Agreement is reached on the scale of monitoring relevant to both the refined Recommended Indicator 1 and refined Recommended Indicator 2.
- Indicators relevant to other NLWRA 'Themes' should be used where available, such as changes in vegetation in response to rabbit control.

The Invasive Animals Group expressed concerns that the tools to monitor impact may be lacking. The Group also suggested that the protocols remain 'generic' to allow flexibility in methods of information collection, and changes that may occur in methods available to monitoring invasive animals information.

Actions arising

The refinements to the Recommended Indicator Protocols be drafted by the National Invasive Animals Project Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicator Protocols within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the finalised Indicator Protocol documents.

Species significance criteria be drafted and species tested against the criteria for discussion and consideration by VPC.

States / Territories identify areas for intensive monitoring of impacts.

3.3 Information Products

3.3.1 Information Products to Support Information Needs

The Invasive Animals Group was asked to address the next state of Indicator development: determining the information and products of greatest value to management at various levels.

Advice on Products

The Invasive Animals Group discussed the refined Recommended Indicators and concluded some clarification regarding terminology would be required through a working group after the workshop. The Group confirmed that determining 'needs orientated products' was the objective.

To address the task of identifying products of greatest value, the Group proposed two questions:

- 1 – How can products improve management on-the-ground?
- 2 – What information should be being collected / collated?
- 3 – What information is currently available to generate products, and are products that report qualitative information valued?

Regarding information needs, the Invasive Animals Group reviewed the refined Recommended Indicators from earlier sessions, discussed the need for protocol documents to complement the Indicators, and re-addressed the fundamental information that regional-land managers require to undertake effective management of invasive animals. The Group identified the following data types and information to address management needs:

- Presence / absence information for species
- Density (i) qualitative ranked data and quantitative data
(ii) frequency of occurrence of a species in a grid cell
- Trends in population (spatially and temporally)
- Resolution of information reported (cell size, property-scale, 50x50km grid)
- Quality of data (what is the origin of data and has it been validated?)
- Impacts of pest animals (measured in terms of environmental, economic and social impacts)
- Level of management, and response of populations to management intervention.
- Number of new incursions and the scale of incursions (expansion or contraction in range, search effort to locate species, and detection and surveillance strategies for new incursions).
- Priorities for management (are there specific priorities for selected areas?).
- Identification of values and assets – what are the values and assets trying to be protected?
- Stakeholder interests (i) what are the role and responsibilities of stakeholders?
(ii) what products are valuable to stakeholders?

- Land tenure types and management activities
- Standards for reporting (quality of data being reported)
- Information on climatic and seasonal conditions
- Current initiatives to undertake control, e.g. baiting applications etc.
- Existing and proposed management plans.
- Action that can be taken on the information presented in Products, e.g. some information provides for better management than others.

The Invasive Animals Group concluded that testing the list of information needs with some trial products could identify what information is of greatest value, and what products can deliver that information in the best manner. The Group similarly agreed that some discussion on Information Products is required with decision-makers following the workshop to clarify the products they require, and that consistency in information collection, collation and reporting is vital.

The Group identified there are a wide range of Information Products already available, as have been prepared from State Agencies of many years of management at various levels. Using some existing products to help determine the products of highest value, considering there are many groups that need products.

The Group also began to identify possible sources of information to address the refined Recommended Indicators and discussed products associated with those datasets, namely existing and past monitoring sites for impacts under Indicator 2.

Recommendations for Products

It was recognised by the Invasive Animals Group that information needs drive the Information Products, and that the best products are those that influence management decisions/ actions at the ground level, while providing important information for higher-end users.

The Invasive Animals Group concluded that:

- 1) The development of the Indicator paper, Indicator Protocols, and Species Lists will be used to clarify Information Needs that are in-turn required before a final decision about Information Products for regional and States/ Territories groups can be made.
- 2) Further discussion is required (involving decision-makers) on possible products based on the proposed list of information and product matters (contained herein).
- 3) The Project Coordinator should re-address Information Needs and Information Products with the State/ Territories during the proposed State meetings following the workshop. Thus, the States need to arrange internal discussion on these matters prior to the State meetings.
- 4) Testing some trial products against the information needs will help to identify what products are of greatest value, and how to refine them to meet evolving management requirements.
- 5) There are a range of existing products that could be used to help identify what products are required, and what components of products are most useful, e.g. land tenure data etc.

Actions arising

States/ Territories undertake internal consultation (involving decision-makers) on Information Needs and Information Products based on the proposed list of information and product matters drafted herein that would be of greatest value to the regional bodies, and the States/ Territories.

A consolidated response from Agencies should be presented to the Invasive Animals Working Group.

A discussion paper addressing all State/Territory responses should be prepared and circulated through the Invasive Animals Working Group and for VPC consideration by a working group member to be nominated at a later date.

The Project Coordinators should re-address Information Needs and Information Products with the State/ Territories during the proposed State meetings following the workshop.

States / Territories should consider existing products that could be used to help identify what products are required, and what components of products are most useful, e.g. land tenure data etc.

4. Data and Information Management

Data and information management issues were raised during several sessions throughout the workshop forum by participants. The delivery of products for decision-makers relies on clear data and information management arrangements. This session consisted of presentations to address current and emerging data management issues to address weeds and invasive animals information and their management; a working example of an effective State-scale pest information system; and a short summary of information systems currently in use throughout Australia.

4.1 Data Management Issues and Quality Control

Data and information management refers to data handlings, storage, manipulation, collation, transformation, reporting/publishing and data management arrangements – exchange, access and licensing. The need for a consistent approach to data collection, collation and assessment, development of information products and the development of an information infrastructure were discussed. The session addressing these and other matters was introduced with an ‘overview of data management issues’ presented by Greg Beeston (Department of Agriculture, Western Australia).

Greg provided an overview of the data management issues expected with management of weeds and invasive animals information. He addressed current and emerging weeds and invasive animals information management, and proposed that the way forward regarding data management for weeds and invasive animals included:

- Allow for inclusion of core attributes information, and record areas where no information is available.
- Allow for inclusion of weed infestations and invasive animal population information from various sources (herbarium specimens, weed and pest animal action groups, local government and Rural Land Protection Boards RLPB data)
- Allow for inclusion of weed and animal control activities and outcomes of control (including success or otherwise, and miscellaneous control information regardless of quality).

Greg reinforced the need to be clear on what we are trying to manage – includes data and information related to location, extent and density plus other measurements and historical records. In presenting a possible way forward Greg stressed the need to allow for capture of control methodologies and their success and that there was a need to be flexible in reporting as some information is often better than none, though failures may only need to be reported at a summary level.

Greg then went on to present a conceptual system design based on a application server with web mapping software allowing experts, state coordinators and public various level of data entry and control.

The above presentation was then further supported by examples of an effective data management system Weed Watcher / Pest Watcher currently in use throughout Western Australia.

To complement information presented on issues associated with weed and invasive animal data and information management provided by Greg Beeston, Marc Bryant presented a working example of an effective State-scale pest information system (PEST INFO) from Queensland's Department of Natural Resources, Mines and Water.

Marc's presentation included a history of the development of the PestInfo system which was supported by a demonstration of the PestInfo Ver 4.2 system currently in use throughout Queensland to capture, store, and report weed and pest animal infestation information, and to coordinate and document control activities. An example of outputs in the format of detailed reports and map compilations was also provided.

Following the above session, Paul Paping (QLD, DNRMW) provided a short summary of information systems currently in use throughout Australia by State / Territory agencies to manage weeds and invasive animals information, and those systems where inclusion of weeds and invasive animals information is intended in the future.

Paul reported on State-based information management systems that included:

- Queensland (DNRM) PestInfo v4.2 for mapping of infestations; and associated Annual Pest Distribution Survey for data collection,
- New South Wales (DPI) MS Access database; and GIS Pest Survey data for 2002 and 2004,
- Victoria's IPMS (Integrated Pest Management System) owned by DSE but operated by DPI field staff; PAIS (Pest Animals Information System) for wild dog data, stock losses and baiting activity information; and Mapshare for live data access,
- South Australia's Pest 2000+ as an MS Access database owned by DWLBC; and PIMS as an incident management system,
- Western Australia's (DAWA) Weed Watcher as a web-enabled system based on Oracle and MS Access database with Geomedia,
- Tasmania's GT SPOT owner and operated by DPIWE, and
- Northern Territory's Weeds and Pest Animals Database (that contains more attributes for weeds and animals).

Paul also reported briefly on the National Biosecurity, Surveillance, Incident Response and Tracing (BIOSIRT) Program, containing Surveillance, Quarantine, Control and Recovery (SQCR), Client and Resource Information System (CRIS), and Resource Management Package (RMP).

It was pointed out that National Information Managers Technical Group or NIMTG (the BIOSIRT Program drivers) had undertaken a comprehensive review of State-based information systems as part of the development and planning stages, and that information from that review could be helpful to the current task.

The session concluded with agreement that the jurisdictions are in-principle supportive of making their data available to contribute to the development of a nationally information datasets. Note: At a senior management level, the jurisdictions have given agreement to support

this process. What remains is to sort out the detail at an operational level to ensure the process develops smoothly. Refer Section 5.0 On-going Data and Information Supply for additional information.

It should be noted that considerable effort has already been put into developing consistent methodologies for data management by the Australian and New Zealand Land Information Council (ANZLIC) and the National Land & Water Resources Audit. To this end the adoption of these methodologies is considered a logical step. As part of this process the development of custodianship and data access / sharing and licensing arrangements / protocols along with issues of data quality etc need to be addressed.

4.2 National Weeds and Invasive Animals Information System

Workshop participants discussed the purpose and suitability of an information system for national reporting of national weeds and invasive animal's information under the refined Recommended Indicators. It was identified that reporting of national-scale information through a national system supplied from State-based, administered and maintained information systems and databases was the ideal outcome.

Blair Wood (NLWRA) spoke on the Indicator development process, the goals regarding an enduring process of reporting to the National Program in order to gain an understanding of national issues. He highlighted that linking in with what is happening at the State/ Territory level at regular intervals is an on-going but high priority to prepare a national report/ series of reports.

Blair also commented that in the long-term, outputs will be assessed by regional groups, and that the value of the outputs need to be greater than the effort in preparing the outputs. Regional groups will use information gained through the system/s to make decisions, and if the information is not provided adequately to make those decisions, then the system/s are unlikely to meet their targets, and investment in the system/s will wain.

Blair also spoke broadly about reporting of weeds and invasive animal's information and a national information system in regard to a need for:

- Its capacity to be enduring.
- On-going reporting to and from the system is the goal.
- The system to be on-going despite being initially driven by a timeframe.
- State/ Territory involvement in the process.
- States/ Territories to maintain their independent datasets.
- Value-adding to existing achievements in information system development and reporting.
- High level sign-off and agreement for data access and on-going data supply.
- Data manipulation for comparability but maintaining quality.
- Support from the Audit.
- Leadership from the Australian Government.
- The output of the information system, and supporting the outputs.

It was noted that the Audit is currently undertaking a review of Weeds and Invasive Animals Data and Information Systems operational at jurisdictional level to provide a basis from which

to make an informed decision on the appropriate 'next steps' in the development of a national invasive species information system. It is anticipated that a draft report will be available in mid-May for consideration by the Audit, Australian Government and State/Territory level jurisdictions.

4.3 Data Access Arrangements

The National Coordinators briefly described the next steps in the process of information collation for national reporting. The National Weeds Assessment and Invasive Animals Work Plan consist of major phases: scoping and project planning; introduction of project proposals to States/ Territories; National workshop to address information needs, products and management; and planning of information collation and reporting during State-visits by the project coordinators. The last phase of the program addresses planning for the collation and delivery of existing State-based information, and determining the on-going requirements for States and Territories to collect; collate and report information to support regional groups in a longer-term.

It was highlighted, that while the attention is currently being directed to technical and scientific issues relating to collation of existing information for reporting, that a formalising data-access and exchange agreement is equally important for both projects. Identifying the requirements for these agreements will be addressed during State-visits as part of the next phase of the programs.

Actions arising

Project coordinators to research templates from other themes for potential use with Weeds and Invasive Animals for consideration at State workshops.

5. On-going Data and Information Supply

Fundamental to the process of reporting the current national status of weeds and invasive animals is an effective and efficient process of information supply to generate valuable national-scale products. Equally important, is the need to ensure on-going products fulfil the evolving needs of decision-makers at the regional, state and national levels.

5.1 Data Collection, Collation and Information Supply

The refined Recommended Indicators for National Weeds and National Invasive Animals are proposed to guide the future collection of information of greatest value to those involved in managing weeds and invasive animals at local, regional, state and national levels. Thus, supporting programs directly involving collecting of information against those Indicators is vital for long-term monitoring and the evaluation of programs, funding initiatives and management outcomes.

Blair Wood reminded the workshop participants that the States / Territories have collectively agreed to involvement in the process at a high-level, but that the operational level needs to be engaged within a clearly defined framework. The States/ Territories have offered to provide in-kind support to reporting information for this process, and as there are immediate reporting needs for the process, if there are costs involved in collating of information, then support from the Audit may be available. Blair outlined what may potentially be required in the development of an incremental task-oriented series of projects at the State/ Territory level to deliver outputs according to schedules of both the weeds and invasive animals work plan.

Discussions regarding data access and exchange agreements at a generic level are currently underway between the Audit and various Government Agencies. What is required to accelerate the process of data exchange is discussion with relevant State-level data managers about data access and licensing arrangements to identify what issues are associated with exchange of data in immediate and on-going capacity.

Actions arising

State/ Territory representatives at workshop to discuss data-access and exchange arrangements and the issues surrounding reporting of information to the Audit with their respective data managers.

6. Conclusions

6.1 Outcomes and Future Directions

WEED ACTIONS

The following is a list of actions for weeds:

- The refinements to the Recommended Weeds Indicators be drafted by the National Weeds Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicators within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the preparation of Draft Indicator Protocol documents, prior to submission to the Australian Weeds Committee (AWC).
- Development of a process for selection/ inclusion of weed species, and a final species list for application in the 'National Weeds Assessment'..
- That the National Weeds Coordinator facilitates the endorsement of the refined Recommended Indicators for Weeds by the Australian Weeds Committee, and ensures AWC advice is incorporated during endorsement.
- That preliminary refinements to the Recommended Indicator Protocols be drafted by the National Weeds Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicator Protocols within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the finalised Indicator Protocol documents for presentation to AWC.
- That the National Weeds Coordinator facilitates the identification and development of various information products suitable to fulfil requirements of the NM&EF. In brief, products need to identify the nature and extent of the problem, what it is effecting (assets) and what is currently being done about it. In addition, to enable complete assessment information is also required on the potential extent of the problem and potential impact. It was noted however, that due to resource constraints only limited data may be available to address impacts.

INVASIVE ANIMAL ACTIONS

The following is a list of actions for invasive animals:

- The refinements to the Recommended Invasive Animals Indicators be drafted by the National Invasive Animals Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicators within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the preparation of Draft Indicator Protocol documents. A footnote defining the term 'significant' should be included in the refined Recommended Indicator.
- The Invasive Animals Group identified that species selection must be addressed and discussed following the workshop.

- It was decided that Significance Criteria be used to establish the species for consideration under the refined Recommended Indicators. Drafting and agreement of criteria was recommended.
- The Invasive Animals working group needs to clarify the refined recommended Indicator 2 (Impacts) regarding the 'impacts' to be measured, as well as how, where, when, why and in what capacity will measurement occur, and determine whether the Indicator is intended to address reduction in impacts?
- National Invasive Animals Project Coordinator facilitates the endorsement of the refined Recommended Indicators for Pest Animals by the Vertebrate Pest Committee, and ensures VPC advice is incorporated during endorsement. The refined Recommended Indicators be presented to the VPC at the AGM.
- Species significance criteria be drafted and species tested against the criteria for discussion and consideration by VPC.
- The refinements to the Recommended Indicator Protocols be drafted by the National Invasive Animals Project Coordinator and distributed to the States/ Territories and stakeholders for discussion. The States will distribute the Indicator Protocols within their jurisdictions as deemed necessary. A consolidated response from all stakeholders will be considered in the finalised Indicator Protocol documents.
- States/ Territories undertake internal process of discussion (involving decision-makers) on Information Needs and Information Products based on the proposed list of information and product matters drafted herein that would be of greatest value to the regional bodies, and the States/ Territories. A consolidated response from Agencies should be presented to the Invasive Animals Working Group.
- A discussion paper addressing all State/Territory responses (consolidated report from discussion on information needs and products) should be prepared and circulated through the Invasive Animals Working Group and for VPC consideration.

GENERAL ACTIONS

The following is a list of actions for both weeds and invasive animals:

- States / Territories identify areas for intensive monitoring of invasive animals and weeds impacts.
- States / Territories should consider existing products that could be used to help identify what products are required, and what components of products are most useful, e.g. land tenure data etc.
- The Project Coordinators should re-address Information Needs and Information Products with the State/ Territories during the proposed State meetings following the workshop.
- Project coordinators to research templates from other themes for potential use with Weeds and Invasive Animals for consideration at State workshops.
- State/ Territory representatives at workshop to discuss data-access and exchange arrangements and the issues surrounding reporting of information to the NLWRA with their respective data managers.

The ACTION ITEMS can be addressed by the national Project Coordinators, the States and Territory's and respective National Coordinator Committees (Australian Vertebrate Pest Committee, and Australian Weeds Committee).

The National Project Coordinators will address the ACTIONS and project development tasks through the following steps:

1. Distribute CD-Rom of background readings, draft monitoring protocols, presentations and workshop material to workshop delegates, collaborators and stakeholders.
2. Provide feedback from workshop as necessary and workshop delegates perceptions of workshop and work plans.
3. Clarify species for consideration under Indicators and two work plans. It is not essential to have a finalised list immediately as development of infrastructure is to accommodate additions./deletions of species from the list.
4. Harmonise terminology between Weeds Indicators and Invasive Animals Indicators where feasible.
5. Prepare paper for AWC and VPC on refined Recommended Indicators and rationale for changes
6. Prepare draft Indicator Protocol paper for AWC and VPC consideration through appropriate working groups giving consideration to existing manuals and methodology statements.
7. Provide additional information to the States / Territories on the current review of information systems. A draft report will be distributed to collaborators for feedback, and a final report will be distributed thereafter. Following this, feedback from jurisdictions will be sought to establish the next steps of information system development, e.g. formation of task force working group, and or hosting of workshop/s.
8. Prepare trial product/s (poster/s) as a communication tool for comment by States/ Territories (either using simulated or partial datasets)
9. Determine whether an Information Systems Working Group is required to establish a national weeds and invasive animal's information system.
10. Formalise and distribute criteria for case studies of Impacts (both weeds and invasive animals themes) for the States/ Territories to consider. A set of criteria for selecting case studies for validation of the impacts of species may include: longevity, species, location, department, reporting, outputs, accessibility, and impact type spanning environmental, social and economic disciplines.
11. Visit states to address questions (as below).

States/ Territories should address the following items and tasks:

1. Distribute workshop feedback within and among State Agencies and appropriate stakeholders
2. Nominate key representatives for the National Coordinators to liaise with regarding on-going program development, particularly relevant where multi-agency liaison is necessary.

3. Identify what species are of greatest relevance to their State and regions.
4. Consider what information needs are greatest for regional bodies and their State / Territory and engage decision-makers in process
5. Identify information that may be currently available to address the refined recommended Indicators at state and regional scale.
6. Identify information on management actions throughout jurisdictions at state and regional levels.
7. Identify where the impacts of species have been assessed, estimated, or monitored to form case studies for Impacts Indicators under both weeds and invasive animals themes.
8. Identify if any proposed programs involving monitoring will either provide information to address the Indicators, or whether refinement is need to provide information to address the Indicators.
9. Consider what information is important for management actions, and identify how that information can be obtained at the State-level, then regional-level.
10. Assist the working groups, national coordinators and relevant committees to identify information needs, information products and information management.
11. Liaise with the national coordinators to ensure the respective work plans sufficiently address State/ Territory needs and regional requirements.
12. Discuss data access / exchange arrangements within their Agencies and liaise with National Coordinators

Vertebrate Pest Committee (VPC) and Australian Weeds Committee (AWC) and their respective working groups to should address the following items and task::

1. Provide feedback on papers prepared by National coordinators on Indicators, Indicator protocols and species lists for Indicators
2. VPC and NLWRA to determine whether fish and invertebrates should be included under Indicators and associated work plans
3. Endorse Indicators and Indicator Protocols

6.2 State and Territory Workshops

The National coordinators shall visit the States / Territories to:

10. Identify what the information needs are at regional, state and national levels, and all relevant stakeholders for collaboration
11. Identify what information is potentially available to address the refined Recommended Indicators and address the information needs
12. Identify what information products are required by the States/ Territories for their own reporting, and are there existing products that may be used to identify National and regional product-needs
13. Identify what data is available to address the Recommended Indicators

14. Address development of compilation standards required for converting state data to nationally consistent data.
15. Discuss data and information access arrangements, data exchange and sharing agreements
16. Identify a timeframe and stages for proposed reporting of existing datasets and a planned approach for ongoing reporting
17. Identify what resources / facilities and support are needed to collate existing data, and develop data in an on-going capacity. Identify gaps in process.

6.3 Participant Reflections

A separate report on Workshop Participants Reflections has been prepared – refer ‘National Weeds and Invasive Animals Information Workshop – Participants Reflections’. Overall, the workshop successfully reached its objectives and provided clarity on issues associated with monitoring, evaluation and reporting of national weeds and invasive animals information to progress current and on-going requirements under the NM&EF.

Acknowledgements

This report was prepared following a national workshop in Hobart funded by the Natural Heritage Trust (NHT) and National Action Plan for Salinity and Water Quality (NAP) through the National Land and Water Resources Audit (NLWRA), and Invasive Animals Cooperative Research Centre (IA CRC). We are grateful to the Australian Government Sponsor Agencies: Department of Environment and Heritage (DEH), and Department of Agriculture Fisheries and Forestry (DAFF).

Special thanks to Jessica Gibson (NSW DPI) for providing pre-workshop assistance and executive support during and post-workshop, Simon Veitch (DAFF) for chairing the workshop; Jim Thompson (QLD DNRMW) for leading invasive animal discussions; and Richard Thackway (DAFF) for leading weed discussions.

We are grateful to all workshop participants, guest speakers, and collaborators of the National Weeds Assessment and Invasive Animals Programs. We would like to thank the following organisations:

Victorian Department of Sustainability and Environment (DSE), Department of Primary Industries (DPI), and Parks Victoria; New South Wales Department of Primary Industries (DPI), and Department of Conservation (DEC); South Australian Animal and Plant Control Group (APCG), and Department of Water, Land, and Biodiversity Conservation (DWLBC); Queensland's Department of Natural Resources, Mines and Water (DNRMW); Western Australian Department of Agriculture and Food Western Australia (DAFWA), and Conservation and Land Management (CALM); Northern Territory Natural Resources, Environment and the Arts (NRETA); and Tasmanian Department of Primary Industries and Water (DPIW) who also provided assistance with workshop facilities (as per Appendix 2).

Appendix

Appendix 1: National Weeds and Invasive Animals Information Workshop Agenda

Hadley's Hotel, Hobart, Tasmania. March 30-31, 2006.

The organisers would like to thank all participants, sponsors, and collaborating agencies.

Background and scope

The National Land & Water Resources Audit (NLWRA) has a key area of activity in fostering the collation of natural resource information collected against indicators developed as part of the National Natural Monitoring & Evaluation Framework (NM&EF), and linking regional, State/ Territory and National datasets.

The NM&EF identifies:

- The Matter for Target - *Ecologically significant invasive species.*
- The Indicator Heading - *Selected ecologically significant invasive species extent and impact.*
- The Recommended Indicators for Weeds (**Status for Advice**) – 1. *The area and density of weeds under active management, and 2. New incursions of significant weeds*
- The Recommended Indicator for Vertebrate Pests (**Status for Advice**) - *Reduction in impact of regionally significant invasive pests (excluding fish).*

Critical to this process is ensuring that the identified indicators continue to be recommended by the relevant National Coordinating Committee, defining the fundamental information required to report against the Indicators, and to establish an enduring and realistic process of information collection and reporting.

Key objectives of the workshop

- (1) Review current indicators, and associated methodological statements and seek endorsement / agreement on the Indicators under the National Monitoring and Evaluating Framework so that they can be presented to the Audit Advisory Council for endorsement.
- (2) Identify and agree on what fundamental data / information is required to report on the national indicators.
- (3) Reach agreement on an appropriate national information management system (s), including developing on-going State/Territory arrangements for the collation and supply of data.

Attachments

1. Paper: Background paper on the Audits role in the National M&E Framework and the relationship with other national activities.
2. Indicator protocol / methodologies for invasive animals

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3. Indicator protocol / methodologies for invasive weeds (1)
4. Indicator protocol / methodologies for invasive weeds (2)
5. Indicator protocol / methodologies for invasive weeds (3)
6. NM&EF protocol paper from AWC
7. Paper: Indicator definitions / terminology / abbreviations
8. National Weeds Strategy
9. Paper: Species list for weeds
10. Paper: Species list for invasive animals
11. Draft field manual for surveying and mapping nationally significant weeds
12. Draft national monitoring manual for pest animals (NSW DPI hand out)
13. Paper: Protocol template – Invasive Animals
14. Paper: Protocol template – Weeds
15. Overview of data management issues, NRM Toolkit

Background

- Jurisdictional summary report
- List of species to be included
- Indicator protocols / methodologies in the NM&EF

Venue: Hadleys Hotel, 34 Murray Street Hobart Phone

Organisers:

Mr. Peter West Email: peter.west@dpi.nsw.gov.au Phone 02 6391 3887

Mr. Christopher Auricht Email: auricht@landsystems.com Phone: 08 8377 3460
Mob 0417 817 579

Facilitator: Jason Alexandra

Workshop Chair: Simon Veitch

<h2 style="margin: 0;">National Weeds and Invasive Animals Information Workshop</h2>	<p style="text-align: right;"><i>Location</i> Hobart, Tasmania</p> <p style="text-align: right;"><i>Date</i> 30th-31st March, 2006</p>
<h3 style="margin: 0;">Agenda</h3>	

<i>Arrival – Wednesday evening / Thursday morning</i>					
DAY 1					
30th March 2006					
<i>Item</i>	<i>Time</i>	<i>Topic</i>	<i>Lead</i>	<i>Attachments</i>	<i>Output</i>
	945-1000	<i>Arrive conference room / tea / coffee</i>			
1	1000-1015	Welcome / introduction	Facilitator/ Chair		
1.1	1015-1030	Introductions and expectations	Facilitator		For Information List of expectations
2		National Monitoring & Evaluation Framework			
2.1	1030-1045	National Indicators, Information Products and Data Infrastructure	NLWRA – B Wood	Presentation Attachment 1	For Information
2.2	1045-1145	National Indicators for Invasive Species (for Advice)	M Grundy (M+E)	Presentation & Attachments 2,3,4,5,6	For Information
		Key questions / issues the Indicators seek to inform – generic resource condition questions	Facilitator		Key questions / issues discussed
		NM+EF Protocol (Weeds – from AWC)	Facilitator	Attachment 6	
			Facilitator	Attachment 7	For Information

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		Indicator definitions / terminology			For Information
2.3	1145-1230	Break-out groups (Weeds and Pests) Part A: Refinement of Recommended Indicators (45mins).	Facilitator / Coordinators	Attachment 8 Attachment 1 - Revisit	For Discussion Discuss suitability of Indicators
	1230-115	Lunch			
	115-145	Break-out groups continued Part B: Recommended species lists (30 mins)	Facilitator / Coordinators	Attachments 9, 10	For Discussion Feedback from groups on species
3		Indicator Protocols / Methodology			
3.1	145-215	Methods for monitoring invasive animals and weeds.	R Thackway / P West	Presentations	For Information
3.2	215-400	Break-out groups – Unpacking the Indicator/s. Information to support reporting against the Indicators (i.e. Extent, density, Management status, Impact, scale) How ,What, Who, When / how often ?	Facilitator / Coordinators	Attachment 11 Attachment 12 Attachments 2,3,4,5,6 Attachments 13,14	For Discussion
	330	Afternoon Tea			
3.3	400-430	Summary of Indicators and methodology proposed by break-out groups.	Weeds and Vertebrate pest Groups /Facilitator		For Discussion Proposed protocols / methodology
3.4	430-530	Information Products. Review generic	NLWRA – P Wilson	Presentation & discussion	For Information

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		Questions.			
	530-545	Summing up Day 1. & issues / objectives for Day 2.	Chair		For Information
DAY 2					
31st March 2006					
	815-830	<i>Arrive conference room / tea / coffee</i>			
	830-835	Summary of Day 1 outcomes and outcomes for today.	Chair / Facilitator		For Information
		Information Products			
4.1	835-915	Information products to support National monitoring and evaluation – example products (20 mins) General discussion / propose products (20 mins)	NLWRA – P Wilson Facilitator	Presentation Propose questions Poster / Maps	For Information For Information List of possible product /s
4.2	915-1045	Break-out groups to agree on Indicators, Protocols and Products.	Weeds and vertebrate pest groups		For Discussion
	1045-1100	<i>Morning tea</i>			
	1100-1230	Continue 4.2. Feedback from groups	Weeds and vertebrate pest groups		For Decision Recommendations on the indicators, protocols and products
	1230-130	<i>Lunch</i>			
5		Data and Information Management			
5.1	130-215	Overview of data management issues	G Beeston	Presentation & Attachment 15	For Information

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		Quality control, information accuracy / currency / scale			
5.2	215-300	Information Systems Demonstration + review outcomes General discussion – National Weeds and Pest Animals information system	M Bryant Facilitator	Demonstration & handouts	For Information For Discussion List of requirements of national info system
	300-315	<i>Afternoon Tea</i>			
5.3	315-345	Arrangements for on-going data collation and supply Objectives for State / Territory workshops	NLWRA P West C Auricht		For Information and Discussion For discussion Tasks for States / Territories documented
	345-350	Workshop close / departure	Chair / Facilitator / Coordinators		

Appendix 2: Workshop Attendance

Australian Government

Martine Franco	National Land & Water Resources Audit
Blair Wood	National Land & Water Resources Audit
Chris Auricht	National Land & Water Resources Audit
Peter Wilson	National Land & Water Resources Audit
Jason Alexandra	Consultant to National Land & Water Resources Audit
Simon Veitch	Department of Agriculture, Fisheries and Forestry
Carol Cribb	Department of Agriculture, Fisheries and Forestry
Quentin Hart	Department of Agriculture, Fisheries and Forestry
Richard Thackway	Department of Agriculture, Fisheries and Forestry
Nikki Ward	Department of Environment and Heritage
Andrew Copp	Department of Environment and Heritage

States / Territories

Paul Mahon	NSW Department of Environment and Conservation
Barry Kay	NSW Department of Primary Industries
SydneyLisle	NSW Department of Primary Industries
Phil Pegler	Parks Victoria
Anne Dennis	VIC Department of Sustainability and Environment
Jim Backholer	VIC Department of Primary Industries
Naomi Wilson	VIC Department of Primary Industries
David Cooke	SA Animal and Plant Control Commission
Greg Mutze	SA Animal and Plant Control Commission
Tony Meissner	SA Department of Water Land and Biodiversity Conservation
Chris Holden	SA Department of Environment and Heritage
Greg Beeston	WA Department of Agriculture
Andrew Woolnough	WA Department of Agriculture
John Asher	WA Conservation and Land Management
Alice Beilby	NT Department of Natural Resources, Environment and the Arts
Glenn Edwards	NT Department of Natural Resources, Environment and the Arts
Keith Ferdinands	NT Department of Natural Resources, Environment and the Arts
Jim Thompson	QLD Department of Natural Resources, Mines and Energy
Paul Paping	QLD Department of Natural Resources, Mines and Energy
Tony Pople	QLD Department of Natural Resources, Mines and Energy
Marc Bryant	QLD Department of Natural Resources, Mines and Energy
Mike Grundy	QLD Department of Natural Resources, Mines and Energy
Christian Goninon	TAS Department of Primary Industries, Water and Environment
Micheal Driessen	TAS Department of Primary Industries, Water and Environment
Chris Cleary	TAS Department of Primary Industries, Water and Environment
Stephen Harris	TAS Department of Primary Industries, Water and Environment

Other Organisations /Agencies

Peter West	Invasive Animals Cooperative Research Centre
Jessica Gibson	Invasive Animals Cooperative Research Centre
Elaine Murphy	Invasive Animals Cooperative Research Centre
John Thorpe	John Thorpe Australia
Peter Last	Indigenous Land Corporation