

Towards Sustainable Grazing - Biodiversity

Managing Living Systems

Workshop Notes

This workshop has been designed to provide you with the tools to assess how biodiversity can be integrated into farming systems, with a focus on managing these areas for multiple benefits on a whole farm basis. Completing this workshop will enable you to discover how to make your property more valuable and attractive, and a more interesting place to live and work.

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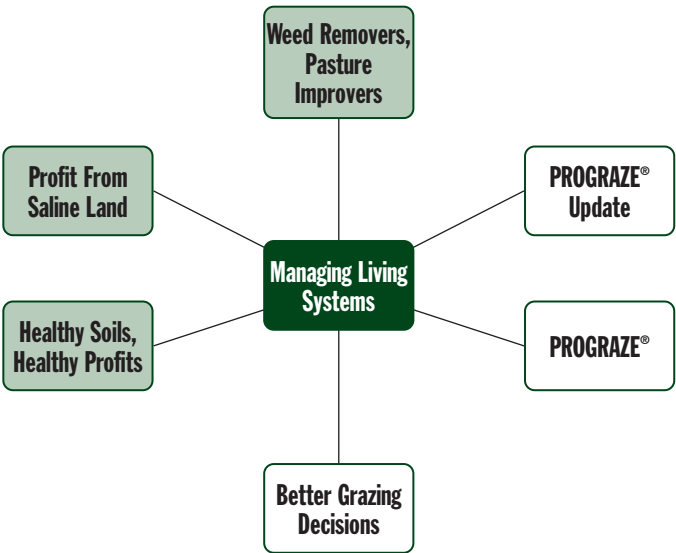
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Introduction

How can biodiversity be integrated into profitable farming systems?

Commercial land managers are stewards of a large proportion of Australia's native plants and animals, and many have long recognised the need for environmentally aware and sensitive practices to maintain the health of their properties. The awareness of the environment amongst the wider Australian community is also maturing.

This shift in awareness recognition of environmental responsibility has increased curiosity about how profitable farming systems can integrate biodiversity.

This workshop provides tools to help identify how biodiversity can be successfully integrated. By completing the workshop you will have the opportunity to develop a whole farm plan, with a focus on managing your property for multiple benefits. Links between biodiversity and production systems will be explored throughout the workshop to draw out these points.

The workshop focuses on grazing enterprises, but has broader relevance for grain growers and mixed enterprise farmers. It is structured around the management of native bush, native pastures (grasslands) and riparian lands within the context of a commercial farm. It also gives some assistance for land managers without native vegetation on their properties – knowing where to start is the important first step.

On the first day of the workshop one of the activities involves learning how to assess the health of native bush, native pastures and riparian land and determining how best to manage them. This will feed into the development of the whole farm plan, on the second day, which will be road-tested on a property.

At the end of the workshop you will have learnt how to make your property more valuable and attractive, and a more interesting place to live and work.

After completing the workshop you will be able to:

1. Describe biodiversity, why it is needed and what value it has.
2. Assess biodiversity on your farm.
3. Identify options for managing agricultural systems that are both profitable and biodiverse.
4. Use a plan that integrates biodiversity into agricultural production systems on your properties and considers the broader regional context.
5. Source additional information about biodiversity.

Group introductions

You may not know everyone in the workshop, so to get to know each other, you will be asked to introduce yourself, what you do and say the one key thing that you hope to get out of the workshop.

An outline of the workshop activities will be available for viewing throughout the workshop. This will help you keep track of where you are in the workshop agenda. Some sessions will be held inside, but nothing beats getting out on the farm and having a good look around.

Exercise 1 – Your property

How does biodiversity relate to your property?

This exercise will provide a benchmark about how biodiversity relates to your property and will be reviewed at the end of the workshop.

Place yourself on a line from A-Z, with Z indicating that biodiversity is part of your core business and A indicating that you don't consider it is important.

Where were you standing on the line?

A _____ Z

Consider the reasons why you selected your position on the line so that you can discuss them with the group.

Why did you select where you were on the line?

What is biodiversity?

Biodiversity means different things to different people. Many people's farm goals incorporate the idea of sustainability and passing on the farm to future generations in a good state. These goals implicitly, if not explicitly encompass biodiversity.

This session provides you with the opportunity to explore what biodiversity means to you. You will be asked how you define biodiversity and the different definitions will be recorded and discussed. At the end of the discussion, you will write down your own description of biodiversity.

Some definitions

It may help to begin by considering some other definitions as these demonstrate the fact that there is a range of approaches to the subject.

The Meat & Livestock Australia Sustainable Grazing Systems program defines biodiversity as:

The diversity of living organisms in grazing systems that sustain and enhance the human and natural environment.

The Commonwealth Government also defines biodiversity and understanding their definition can be important as it forms the basis of different legislation, policies and programs. For example, the International Convention on Biodiversity, the National Strategy for the Conservation of Australia's Biodiversity (NSCABD) and the Commonwealth's Environment Protection and Biodiversity Conservation Act (1999) use the following definition:

Biodiversity is the variability among living organisms from all sources including, inter alia [amongst others], terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

The National Strategy for the Conservation of Australia's Biodiversity expands on the three levels at which biodiversity occurs.

Genetic diversity

Genetic diversity is the variety of genetic information contained in all of the individual plants, animals and micro-organisms that inhabit the earth. Genetic diversity occurs within and between the populations of organisms that comprise individual species as well as among species.

Species diversity

Species diversity is the variety of species on earth. Australia is home to more than one million native plant and animal species (mostly invertebrates), many of which are found nowhere else in the world. About 85% of flowering plants, 84% of mammals, more than 45% of birds, and 89% of inshore, temperate-zone fish are endemic – that is they are only found in Australia.

Ecosystem diversity

Ecosystem diversity is the variety of habitats, biological communities and ecological processes.

The Living Systems project 'Biodiversity in Property Management Planning' in Victoria uses the term native biodiversity. Native biodiversity is defined as:

Indigenous (local native) ecosystems and their components including native plants, animals or micro-organisms.

Exercise 2 – Defining biodiversity

Following the group discussion about what biodiversity means, write down what the term means to you:

System Diversity

Biodiversity incorporates the diversity of ecosystems such as forests, heathlands and wetlands. Land managers often identify three main systems of interest when discussing native vegetation, or biodiversity. These are native bush, native pastures/grasslands, and riparian zones (farm watercourses, wetlands and dams).

These broad vegetation types are often used as a shorthand way of thinking about, or describing, biodiversity. They each have a range of native plant and animal species associated with them. They also can play a vital role in production systems. For example providing shelter for stock or crops, and forming part of the overall farming enterprise.

This section of the workshop will detail the three biodiversity systems which form the basis of the native vegetation assessment you will complete as a field activity. You will also have an opportunity to think about how these systems relate to your own property and region.

You will work in small groups to discuss these systems from both a conservation and production perspective. You will also consider how they relate to your own circumstances. Each group will be responsible for one system – so one group will discuss native bush, another group will focus on native grasslands/pastures, and another will tackle riparian zones (farm watercourses).

The facts and figures intentionally focus on the definition and extent of these systems, as well as the native plant and animal species they support. Discussing how they relate to the farming enterprise and its profitability will continue throughout the workshop. The information in these workshop notes will be a useful future reference for you and others involved in your business.

Exercise 3 – Biodiversity systems

Your group will be asked to report back on the following issues:

- The workshop is focusing on three main systems (native bush, grasslands/pastures and riparian zones), are there any other systems on your farm or in the region that should be added?
- How has this section of the workshop made you think differently about biodiversity on your farm, especially in relation to the role of these systems for native animals?
- What role does the system you discussed play in your farm situation? Does it have particular benefits for production and the long-term sustainability of your property?

Write down the key points your group discussed.

Native bush

Additional information

Image 1 – Two colour photos of native bushland – one showing understorey (Armidale, NSW) and the other scattered trees over crops (SA).

Image 2 – The range of roles played by trees and understorey (2 different images) for native animals –from David Lindenmayer’s farm wildlife book.

Native bush is vegetation dominated by woody species, particularly trees and shrubs greater than two metres tall. There are two main categories of native bush:

- Native vegetation – the ‘original’ vegetation, which can include regrowth.
- Revegetation – this covers a range of plantings from those with a primarily conservation focus to those with a principal focus on commercial outcomes such as farm forestry.

Native trees and understorey provide places for many native animals to feed, shelter and breed. They are vital to attracting and keeping a large range of native wildlife on farms.

Big old trees are particularly important. For every 10 large trees on a property, the number of bird species increases by 30%.

Large trees often contain hollows that are critical to the survival of over 300 species (or more than 15%) of Australian native vertebrates.

Scattered paddock trees are important for animal habitat and provide a range of other functions. Many birds and animals feed and nest in isolated paddock trees and they also provide 'stepping stones' for birds and bats moving from place to place.

Native bush has been extensively cleared for agriculture and urban development in large parts of eastern and southern Australia. Vegetation types on the more productive land were particularly targeted and many are now quite rare.

Native grasslands/pastures

Additional information

Image 3 – Two colour photos of native pastures/grasslands– one showing native pastures (Tasmania) and the other a high conservation value native grassland (southern NSW).

Image 4 – The range of roles played by native grasslands and other habitat elements for native animals – from David Lindenmayer's farm wildlife book.

Native grasslands are dominated by native grasses and have few or no trees or shrubs (generally with less than 10% canopy cover).

Native grasses can have high aesthetic value and provide habitats for native flora and fauna. Herbs are usually abundant.

In south-eastern Australia around 700 species of native herbs and been identified in native grasslands, the majority of which are not grasses. These can provide a wonderful display of wildflowers in spring.

Grassland communities include a large number of other organisms as well, including a wide variety of native insects, spiders, frogs, reptiles, birds and mammals.

In their 'purest' state, native grasslands are very rare vegetation communities and should be managed primarily for conservation if they are found on a property. For example, in Victoria between 0.5 – 1% of natural temperate grassland communities remained in 2001. At the national scale, natural temperate grassland is one of Australia's most threatened ecological communities

Intact native grassland and grassy woodlands provide critical habitat for threatened native animals such as the olive legless lizard (*Delma inornata*), which occurs in south-eastern Australia.

Pasture is a description of land use, and some extraordinarily diverse native grasslands are used as pastures.

Riparian zones

Additional information

Image 5 – Two colour photos of riparian zones – one showing a river with its associated vegetation in reasonably good condition, the other a drainage line where water only flows occasionally (both around Bathurst, NSW).

Image 6 – The range of roles played by riparian zones (farm watercourses) for native animals – two images (one of creeks and wetlands, the other farm dams) from David Lindenmayer's farm wildlife book.

Riparian land is any land that adjoins or directly influences a body of water, including wetlands, dams, creeks, streams and rivers. They occupy the lower parts of the landscape where there is generally more water and better soils.

Rivers, creeks, wetlands and farm dams play a critical role for native plants and animals, even though they usually only occupy a small part of the landscape.

Riparian zones tend to have high levels of biodiversity as a result of the wide range of habitats and food types and the close proximity of water.

Many native species depend on the riparian zones for all or part of their lifecycle or food supplies.

In many areas in rural Australia, riparian zones and roadsides make up a large part of the native vegetation.

River and creek systems provide a natural corridor system, both locally and at a larger scale linking the tablelands to the lower reaches of a river.

Protecting and restoring riparian vegetation has benefits for sustainable land management as well as biodiversity.

The contribution of drainage lines or 'gullies' (where water rarely flows) to biodiversity is less well recognised than creeks and wetlands. While they occupy a relatively small area they have very high value for native animals.

Exercise 4 – Valuing biodiversity

The benefits of biodiversity are not always clear cut or short term – they will depend on a person's location, how their property is organised, the biodiversity that is present or can be restored, their financial status and especially on personal outlook and aspirations.

A range of potential benefits has been identified for biodiversity. Some are 'hard' (and definable or economic) and some 'social' (relating to personal or community values) from improved management of biodiversity.

In grazing systems, the shelter provided by native bush, and the contribution of native pastures to the farming enterprise, are two production related benefits. These and other benefits at the paddock, farm and regional scale are best demonstrated using figures and examples – provided on the following pages.

To help explore these benefits and values, each person will be asked to select and answer one of these (or similar) questions.

- ☐ **What do you most like about your favourite spot on your property?**
- ☐ **How do you value biodiversity on your property?**
- ☐ **How has the level of biodiversity changed on your property?**

Tick the question you would like to address and record your answer below.

Further information

Image 7 – Paddock production benefits of native vegetation/biodiversity. Source – RMIT University.

Paddock scale benefits

Shelter

Paddock scale benefits of native vegetation begin with shelter. Patches of remnant or revegetated woody native vegetation offer physical protection from wind and weather, as well as influencing temperature and humidity. The shelter provided by woodlands can be generalised as at least equivalent to windbreaks of similar size, which both prevent crop and stock losses and improve their productivity.

Stock losses at lambing or after shearing are increased by exposure to cold or wet weather. Lack of shade in mid-summer adds to distress and loss of condition for all stock animals, as forced shuttling between shade and water consume scarce kilojoules and overheating impedes their normal metabolism. The demonstrated benefits of shelter identified for stock include greater weight gain, greater wool production, and better survival of lambs and off-shear sheep.

Native pastures

Mixed pastures of perennial native grasses have been demonstrated to be comparable and in some aspects superior to introduced pastures. Native grasses have shown greater persistence, stability and drought tolerance than non-native pastures, particularly in dry areas or those with poor or degraded soils. The dry-matter productivity, protein content and digestibility of some native grass species are on a par with the introduced cultivars, findings supported by studies of relative economic productivity. The deep roots and summer growth (of some species) is also expected to prove useful in managing salinity, an example of native vegetation serving multiple functions on the farm. Ongoing research into improving native cultivars and propagation for seed production will support native pastures into the future.

Beneficial organisms

Native vegetation both provides pollinators (native and introduced) and supports managed bees that may be brought onto the farm to improve pollination of crops. Without native flowering plants to feed on, managed hives decline.

Pest control by native birds and insects is known to be significant for pastures, believed to be so for crops and is important for the native vegetation itself. All birds are thought to consume insects to some degree, and a host of native insects, reptiles and mammals have been reported predating agricultural pests. Some pest predators can stop pests from reaching major outbreak proportions by themselves rapidly increasing in numbers. Limitations of the pest control benefit include proximity to and quality of the native vegetation habitat, and pesticide impacts.

Pest control by native animals

- 100 ibises consume up to 25,000 insects per day (notably locusts and grasshoppers). It has been estimated that the ibis in the Barmah and Gunbower forests in northern Victoria provide natural insect pest control on 100,000ha of adjacent cropland, worth an estimated \$675,000 a year.
- Magpies will consume up to 40 scarab beetle larvae per day.
- Insectivorous bats can consume up to half their bodyweight in a single night.
- The diet of the southern freetail bat comprises about 80% of the Rutherglen Bug, a serious agricultural pest.
- Sugar gliders have been estimated to each eat 3.25kg of insects per year.
- Native wasps are possibly the most significant beneficial insect taxa. Hundreds of species of wasps parasitise a wide range of insects, often on a one-to-one species basis and are particularly useful in control of aphids and pasture grubs.

Source: Fact Sheet. *Benefits of Biodiversity*. Department of Primary Industries, Victoria.

Farm scale benefits

Further information

Image 8 – Farm scale production benefits of native vegetation/biodiversity. Source: RMIT University.

Benefits of native vegetation at the farm scale include control of soil erosion through better water infiltration, less raindrop impact effects, the slowing or stopping of overland flows and the reduction of wind erosion.

The aesthetics of living on a farm with native vegetation are important to most landholders. Recreational activities such as walking, riding, camping and fishing rate highly as uses of native vegetation on farms.

The health of humans on the farm can also benefit from native vegetation, due to its effect in suppressing airborne dust, significant in asthma and bronchial complaints, and chemical spray drift, also believed to have health impacts. Windbreaks (and so arguably native woodlands) can reduce transmission of these pollutants by at least 50% within three to ten windbreak heights, and up to 80% for some particle sizes and conditions.

Valuable secondary products of remnants (that can also be designed into revegetation) include brushwood (for fencing), flowers and other floristry materials, wood for heating or craft uses, native plant seeds, and bush foods. Getting the real returns from most of these products requires particular skills or equipment, and some

understanding of their markets, but the initial investment required to harvest these products is modest in dollar terms (three figures). Remnants can also provide incomes through eco-tourism and beehive agistment. Grazing is another use of remnants that can be sustainable, with careful management.

Research into the relationship between native vegetation on farms and farm sale prices is sparse and mixed. The majority of landholders however admit that the presence of native vegetation was significant in their decisions to purchase, so there may be some effect on a properties saleability.

Farmers with well managed native vegetation may obtain a marketing advantage by entering into a quality assurance scheme that includes biodiversity criteria. For example,

In 2000, Australia's first food quality assurance scheme, incorporating nature conservation, was launched in Devonport. The Tesco Natures Choice Programme was carried out by 80 export onion growers and is being hailed as a model for how to maintain biodiversity values on commercial farms, while making their produce more attractive in the market place. Farmers were offered a \$10/t premium on onions if they could demonstrate wildlife friendly production.

Catchment scale benefits

Retaining or planting native vegetation is the most successful strategy for reducing leakage to groundwater. Groundwater levels under native vegetation are commonly meters lower than for equivalent cropped areas, and soil and water salinity in uncleared catchments is lower than that for cleared ones. All native vegetation, remnant or revegetated, is thus of benefit.

Native vegetation, particularly around watercourses (referred to as 'riparian vegetation'), can filter out or immobilise pollutants to the benefit of all downstream users of the water. Water leaving a farm, whether through soil or overland, can carry a wide range of solutes and particles, such as soil, nutrients, heavy metals, biocides and micro-organisms. The impacts of nutrients and soil are the most obvious, in the eutrophication and silting up of waterways, but less obvious impacts can cause greater damage, such as the bio-accumulation of pesticides.

Exercise 5 – The big picture

From a biodiversity perspective, it is the whole landscape that is important, so most of the principles and issues relating to biodiversity need to be discussed at a farm and regional scale.

An aerial perspective is the best way to find out where your native vegetation is and how it fits within your property management. This can be provided by aerial photographs, vegetation maps or satellite images.

This section of the workshop will provide the opportunity to identify where your property sits within the larger region. The aerial image of the region illustrates well how biodiversity can be retained and enhanced, both on people's farms and regionally. This is based on a number of principles, outlined below. In particular, remember the three R's (retain, restore and revegetate)! Depending on how much native vegetation you have on your property, you will start at different points.

The thresholds and targets that are currently being developed as part of integrated regional plans also start to make sense at this regional scale.

Examining aerial images

Questions to consider when examining aerial photographs, or other images, include:

- Where are the largest and best quality remnants of each habitat type?
- Which vegetation types are likely to be missing?
- Are the locations of threatened species or significant sites known?
- Where are the watercourses and wetlands?
- How could an existing remnant be enlarged?
- Where could corridors be placed to increase connectivity?
- What regional plans and programs are relevant?

These and other issues will be discussed in the regional context. To capture your thoughts, answer the following question.

What are the three key points that came out of the discussion of the big picture?

Management Principles

The following principles, referred to as The Three R's, collectively provide some indication of how biodiversity might be managed, encouraged, and enhanced within grazing properties.



The priorities for biodiversity management and protection on farms are now clear – retain, then restore, and finally revegetate. Both cost and degree of difficulty increase as you move from retain to revegetate. However, if you have little or no native vegetation on your property there is still a lot that can be achieved.

Retain

Blocks and patches of native, remnant vegetation that are in good condition are extremely valuable and should be the initial focus of protection and management. The goal is to make sure that these stay in good condition.

On grazing properties, fencing a remnant is usually the first step in management. Active management of these remnants is also needed including weed and pest control and managing natural regeneration. Where possible, the aim with new fencing should be to benefit farm production such as the division of paddocks for more strategic grazing.

Restore

Many blocks and patches of remnant vegetation on grazing properties have been altered, reducing their conservation value. Typically, the understorey layer in woodland has been lost through constant grazing. However, restoration of this somewhat degraded remnant vegetation is usually much easier than 're-creating' native vegetation.

Actions to restore and improve bush health can be taken through weed eradication, grazing management, natural regeneration or enhancement planting. Other management tools can include the judicious use of fire and control of feral animals.

Revegetate

On many properties, there is either very little or no native vegetation to provide a healthy farm ecosystem, so revegetation is important. Revegetation will be most effective in the short-term, if it is used to enhance, enlarge and link existing patches of remnant vegetation that are already protected, or that are being restored. If

you are starting from scratch, finding out what used to be on your property can be useful and again try and revegetate where you will buffer or enhance native vegetation nearby.

Natural regeneration may be an effective and cheap means of revegetation. However, in some cases, direct seeding or the planting of tube stock will be necessary. To increase the success of establishment, inoculation of soil with micro-organisms such as fungi and nitrogen fixing rhizobium is recommended.

There is a considerable amount of information available on the management of biodiversity and potential benefits that may help you plan. For example you can read about the relationship between planted trees and native bird species to find that a survey revealed there were 43% more species of woodland birds when more than 80% of the trees were local natives.

While samples of information are provided as part of this workshop, additional sources are listed and provided for you to use as a reference in the future.

Farm and regional scale principles

There are widely agreed principles that are relevant at the farm and regional scale and that lend themselves to this discussion. For example, where possible it is better to have:

- Less edge, more buffer.
- More connections.
- Bigger patches.
- Watercourses included.
- A number of habitat types.

Source: Platt 2002.

Thresholds, targets and regional planning

At the whole-of-landscape scale, there is emerging evidence that a minimum of 30% native vegetation is required (though some native species become threatened with as little as 30% clearing). It can be difficult to translate a regional target to the individual farm scale, because the 30% target includes vegetation contained in National Parks, reserves, state forests, and road sides as well as that contained on private properties.

Some general principles for sustainable management of grazing country in the high rainfall zone of southern Australia have been developed. They state that:

- Bare ground in pastures must be less than 30% of ground surface.

- Tall and medium tussock grasses need to be maintained over 60-70% of native pastures.
- Woodland cover of 30% is needed across the whole landscape.
- Woodland patches should be a minimum of 2ha but larger areas are much better.
- 10% of any property should be managed to encourage biodiversity.

Overall there has been little research on biodiversity thresholds for grazed ecosystems in the high rainfall zone of southern Australia. Understanding thresholds is a priority for research and community action.

Thresholds and targets for native vegetation and biodiversity are currently being developed and discussed as part of integrated regional management plans.

These are an essential part of the extension of the Natural Heritage Trust (www.nht.gov.au) and the National Action Plan for Salinity and Water Quality (www.affa.gov.au/actionsalinityandwater) and in many cases will build on regional plans that are already being developed. In Victoria, these will be the Regional Catchment Strategies developed through each Catchment Management Authority.

Regional vegetation strategies are being prepared for all Victorian catchments to provide a strategic direction for future programs and actions in relation to the management of native vegetation and related biodiversity issues. They will become a component of Regional Catchment Strategies and provide guidelines to:

- Maintain all native vegetation types at 1999 levels.
- Enhance the quality of existing native vegetation by managing 90% of native vegetation according to Best Management Practices by 2010.
- Increase the cover of native vegetation to 30% of the catchment.
- The cover of threatened Ecological Vegetation Communities to be at least 10% of their pre- European vegetation cover by 2030.

In New South Wales there are 19 Draft Catchment Blueprints that include targets for salinity, riverine ecosystems and biodiversity. For example, the target for native biodiversity in the Gwydir catchment is:

By 2003 secure native biodiversity by retaining at least 1418715 ha (53%) native vegetation cover across the Gwydir catchment, of which at least 266,133 ha (10%) of catchment area is managed by conservation by 2010.

Regional plans such as these should be considered when developing whole farm plans for your property.

The focus of the assessment is on vegetation and important habitat features, rather than assessing native fauna directly. For those interested in pursuing this further, information on how to survey native animals is provided below and in the reference list. Professional assistance is available in most states, especially for surveying fauna.

Details on who to contact will be available through the EMS Biodiversity Resource Guide (2003) that includes comprehensive information at the state and Commonwealth level. A CD Rom has been produced as part of the NSW Agriculture 'Introduction to Environmental Management Systems in Agriculture'. This is available from NSW Agriculture (Phone 1800 025520).

The ability to identify plants varies depending on the season (the presence of flowering material making the process easier), so some backup material such as photocopies of specimens or local guides will be necessary.

Surveying native animals

Important habitat elements for native fauna species include understorey vegetation, leaf litter, hollows and cracks in trees (living and dead), rocky areas and woody material on the ground. The availability of water, including moist soil, is critical for species such as frogs.

It can be surprising how many nocturnal mammals, including bats, can present on a property or in a region. Possums and ground mammals that are active at night can be detected by spotlighting or interpreting their scats and tracks (see Trigg 1996). Certain mammal species have different types of eye shine, which is useful for identification purposes.

Bats can be detected with sensors that pick up their different ultrasonic calls, or by using a harp or mist trap.

Birds are easier to survey, with the method preferred by Birds Australia being 20 minute searches over a 2ha area. For those interested in finding out more about surveying native animals, the Department of Agriculture in NSW has developed some guidelines for wildlife surveys that include considerable detail (see www.agric.nsw.gov.au/reader/2735).

Insects and micro-organisms make up the bulk of the native species and play a critical role in processes such as decomposition. Soil under cultivation loses many of the larger soil animals (ants, earthworms, millipedes etc) that improve soil by cycling nutrients and creating soil pores, contributing to water infiltration, soil stability and natural fertility. Land left fallow or under pasture is eventually recolonised, with nearby native vegetation an obvious

source of these animals. While many insects are found in the soil, the bark of one tree can be home to at least a couple of hundred species of insects. Community monitoring techniques have been developed for invertebrates by CSIRO – The Ecowatch Program (see www.ento.csiro.au/ecowatch/index.htm).

Exercise 7 – Your property assessment

Before the next workshop, take the time to assess the native bush, riparian zones (farm watercourses) and native grasslands/pastures on your property using the assessment forms provided. This will help prioritise the management actions that will be developed on the second day of the workshop.

Step 1

Mark the location of the patches of bush, riparian areas and native pastures/grasslands on a rough map of your property.

If there is more than one patch on a property, give each patch a number or name and transfer this to the top row of the assessment sheets for the different vegetation ‘systems’.

Step 2

Assess the health rating of your native vegetation by answering true or false to the questions in the assessment sheets.

Step 3

Record the colour of the health rating corresponding to the number of ‘true’ scores for each patch in the bottom line of the assessment sheets.

Step 4

Go back to the farm map and colour, or mark, the different patches of native vegetation.

Health rating 1	Green	Quality bushland
Health rating 2	Yellow	Moderately degraded bushland
Health rating 3	Red	Highly degraded bushland

Native bush assessment sheet

Assess the health rating of your bushland patches by answering true or false to the following assessment points.

Important issues	Patch of bush being assessed	Patch number			
The patch in context – <i>shape and connectivity.</i>	Bushland patch is greater than 0.6ha.				
	Joined to other bushland by a bush corridor or scattered trees more than 50m apart.				
Native vegetation – <i>overstorey, understorey and ground layer.</i>	Trees mainly healthy, with little or no dieback.				
	Old growth trees with hollows present.				
	Less than 20% of trees have mistletoe.				
	Dead timber is left standing.				
	Native shrubs are present in the understorey.				
	Seedlings or suckers less than 2m tall are present.				
	Ground flora is mostly native grasses and herbs.				
	Fallen timber and logs are left on the ground.				
	Ground is covered with litter of leaves, bark and twigs.				
Pests and weeds	Free of feral predators such as foxes and cats.				
	Bush is free of rabbits.				
	Weeds are absent or found only around the edges.				
Management	Area is free of fertiliser application or herbicide drift.				
	Free of vehicle tracks (other than fire trails)				
	Area is free of land degradation e.g. soil erosion, salinity.				
Total number of true scores					
Bushland rating: (green, yellow or red)					

Determining the rating

Determine the bushland health rating that corresponds to the number of 'true' scores your recorded for each 'patch' you assessed. Indicate the rating at the bottom of the assessment sheet.

15-17 'true' observations = green rating

Quality bushland that is mostly undisturbed and should be a good mix of tree ages, with natural regeneration occurring. The understorey is comprised and native grasses and herbs or native shrubs. The patch contains a range of habitat for wildlife (ie litter, logs, shrubs, tree hollows etc.)

10-14 'true' observations = yellow rating

Moderately disturbed bushland with some regeneration of trees and shrubs. May be a regrowth area of trees of even age. Native shrubs and grasses present in the understorey, but there may be weed invasion. Important habitat elements may be missing.

0-10 'true' observations = red rating

Highly disturbed bushland that cannot be sustained under current management practices. The native understorey is absent and replaced with improved pasture species or weeds. Dead and dying trees are present and there is no natural regeneration of trees or shrubs. This scenario can be improved with considerable time and effort.



Riparian zone assessment sheet

Assess the health rating of your riparian zones by answering true or false to the following assessment points.

Important issues	Section of watercourse being assessed	Zone number			
Native vegetation	Native vegetation strip 20-30m wide along each bank.				
	Significant proportion of continuous mature native trees along both banks.				
	Groundcover mainly native plants.				
	Native tree regeneration occurring.				
	Native water plants present.				
Bank stability	Banks not trampled down by stock.				
	Banks stable under flood conditions.				
	No erosion present.				
Watercourse flow	River channel not widening over time.				
	Major sand/silt banks absent.				
	Major in-stream blockages absent.				
	Deep pools and riffles present.				
Floodplain	No river outflanking/floodplain stripping.				
	No cultivation immediately adjacent to watercourse.				
	No cultivation on adjacent steep slopes.				
Pests and weeds	Feral predators such as foxes or cats absent.				
	Blackberry/exotic shrubs and grasses/weeds mainly absent from banks.				
	Willows/exotic trees absent.				
	Algal blooms absent (all year).				
Total number of true scores					
Watercourse rating: (green, yellow or red)					

Determining the rating

Determine the riparian zone health rating that corresponds to the number of 'true' scores your recorded for each 'patch' you assessed. Indicate the rating at the bottom of the assessment sheet.

16-19 'true' observations = green

This riparian zone is in excellent condition, very stable. Maintain current management conditions.

8-15 'true' observations = yellow

This riparian zone is showing signs of decline and instability. It would be advisable to implement a rehabilitation program.

0-8 'true' observations = red

This riparian zone is unstable and degraded. It would require the immediate implementation of a rehabilitation program.



Major drainage line assessment sheet

Assess the health rating of your major drainage lines by answering true or false to the following assessment points.

Critical feature	Line number	
Healthy native trees and shrubs along drainage line.		
Native tree regeneration occurring.		
Willows and other exotic trees absent.		
Banks stable and not trampled down by stock.		
Rabbit warrens or other activity absent.		
Gully head erosion and erosion along drainage lines absent.		
Understorey vegetation mainly native plants.		
Blackberry and other major weedy shrubs absent.		
Rubbish dumping absent.		
Total number of true scores		
Drainage line health rating		

Determining the rating

The greater the number of 'true' responses the better the condition of the drainage line. Use the following descriptions to determine the rating for each major drainage line you assessed and record the result at the bottom of the assessment sheet.

All 'true' observations = green

Mature native trees with understorey of native grasses and/or shrubs. The trees are regenerating and there is little or no weed invasion. The banks are in good condition and there is no evidence of erosion. This system is very stable with no gully erosion.

Some 'true' observations = yellow

Trees associated with this drainage line are dying or replaced by exotic species such as willow. Many weeds are present and there is some erosion. No regeneration of trees is occurring.

Few or no 'true' observations = red

Native trees are absent from this drainage line due to past clearing and/or tree deaths. There is significant erosion occurring and weeds dominate the vegetation of the drainage line. This drainage line is unstable.

Native pasture assessment sheet

Assess the health rating of your native pastures/grassland areas by answering true or false to the following assessment points.

Important issues		Area number			
The patch in context	The patch joined to other native vegetation.				
Native vegetation	Large and medium tussocks represent over 60-70% cover.				
	There scattered trees and shrubs.				
	Native herbs and flowers are present.				
	Bare ground is less than 30%.				
	Rocks or crevices are present.				
	Seedlings or suckers of native plants are present.				
	Fallen timber and logs are left on the ground.				
Pests and weeds	Weeds are absent or found only around edges.				
Management	Area is free of land degradation (eg soil erosion, salinity).				
Total number of true scores					
Native grassland health rating					

Determining the rating

The greater the number of 'true' responses the better the condition of the drainage line. Use the following descriptions to determine the rating for each native pasture/grassland area you assessed. Record the result as the bottom of the assessment sheet.

8-10 'true' observations = green rating

5-7 'true' observations = yellow rating

1-4 'true' observations = red rating

Planning

Seeking multiple benefits from your investment can greatly improve the returns from the expenditure of time and dollars on biodiversity.

Like all other aspects of successful farming, biodiversity will not be achieved unless it is a core part of the vision and plan for your property. Formal or informal farm plans are an excellent way to set priorities and to plan restoration and revegetation so it will achieve multiple benefits. Tree planting and fencing have long-term implications on property management, so it is important to plan them well. It is also important to ensure that long-term planning objectives take account of regional management plans that are being developed in many parts of Australia. (as discussed in the earlier part of the workshop).

Aerial photographs are often used for whole farm planning at property scale as they are excellent for identifying and quantifying the different types of habitats or vegetation types that are present; for identifying opportunities for restoration and revegetation and especially for linking vegetation patches.

This part of the workshop will only cover the broad principles of whole farm planning, additional detailed courses and resources are available.

Exercise 8 – Your plan

Draw the following elements on butchers paper:

- Property boundary
- Assets such as native bushland, creeks, swamps and the ratings (red, yellow and green) they determined from the assessments you did at home.
- Infrastructure such as roads, fences buildings.

Draw what changes you would need to make to RETAIN, RESTORE and REVEGETATE your property, with an emphasis on meeting multiple benefits from these changes.

The ratings you have identified for your different natural assets as part of the 'work at home' will help prioritise your actions. A checklist is also provided to help identify some of the issues associated with incorporating biodiversity into property plans.

Your notes:

The management implications of implementing one person's plan will be discussed as a group, including the associated costs and benefits. Where possible, relate them back to the discussions you had on the subject of benefits, earlier in the workshop.

Some thoughts on planning for multiple benefits

These points are designed to help stimulate discussion about planning for multiple benefits.

Few properties are managed uniformly across the whole farm and biodiversity considerations give additional reasons for varying management and supporting variations across the farm.

- On many farms, profitability can be increased by investing heavily in the most productive and intensive parts of the farm and de-intensifying production in the more natural areas of the farm where remnant vegetation often remains.
- Mixing and matching intensively managed areas (usually based on introduced crops and pastures) with less intensive areas (containing native species) helps to minimise the external impacts of agriculture, to maintain biodiversity and to maximise the positive benefits from biodiversity on the agricultural production system.

The benefits from biodiversity encouragement and protection are not always clear or short-term. Seeking multiple benefits from the investment can greatly improve the returns from the expenditure of time and dollars on biodiversity. Some examples are:

- Woodlands on a grazing property can contribute a range of services. These include, grazing value; salinity control, pest control, stock shelter, firewood and wildlife habitat, pollination services – the particular mix of benefits will be site and situation specific.
- Commercial forestry is an option in some locations, but where it is not, most benefits are achieved by using local native species for windbreaks, salinity prevention etc.
- Use the fencing needed to protect existing vegetation or new plantings (whether for amenity, biodiversity, windbreaks or commercial agro-forestry) to increase subdivision and potential for improved grazing management.
- If planning revegetation for one reason (eg windbreaks for stock) it is worth investigating what other benefits can be obtained (eg salinity protection, increasing the size of remnants, linking remnants, providing protection to riparian zones, firewood or other commercial timber options).
- Value can be added to existing remnants by using additional plantings to increase remnant size, link remnants, and expand/protect riparian zones etc.

Planning checklist

The following is list of points that will help your plan to incorporate biodiversity into property planning

- ☐ Give priority to high quality native vegetation and threatened species and their habitat.
- ☐ Separate land class units and provide for wildlife habitat in each zone, including some sites with high natural fertility.
- ☐ Give consideration to vegetation types that are poorly represented in the landscape.
- ☐ Represent the range of habitat features that occur naturally including provision for understorey and ground cover vegetation.
- ☐ Give priority to areas with existing large old trees and protect dead trees.
- ☐ Fence off areas for natural regeneration and wildlife habitat.
- ☐ Protect watercourses including streams, gullies, watercourses and wetlands.

- ❑ Link areas of remnant vegetation on your property as well as to property beyond your farm.
- ❑ Provide shade and shelter for wildlife.
- ❑ Fence off recharge areas – trees that can be planted to lower water tables and prevent salinity.
- ❑ Stabilise eroding or eroded areas.
- ❑ Reduce wind speed across the farm, reduce evaporation from farm dams and protect bare soils, crops and pastures.
- ❑ Integrate wildlife with other property uses/values/issues (eg fire safety).
- ❑ Contribute to the regional strategies for your catchment.

Source: Goldney and Wakefield (1997) and Platt (2002)

Farm scale benefits

Further information

Image 9 – A map of the property boundary, natural assets such as native bush and riparian zones and infrastructure. It broadly illustrates the approach being taken in this module.

Image 10 – The management actions that are being considered a property shown. It broadly illustrates the approach being taken in this module.

Exercise 9 – Multiple benefits

This session will largely be held outside and will follow a ‘walk and talk’ format. The whole farm plan developed for the property in the mornings session will be discussed in the field. If a whole farm plan has already been implemented, the farmer will share the lessons they have learnt and how far they have to go.

This session provides an opportunity to explore multiple benefits associated with integrating biodiversity into production systems, as well as issues associated with managing natural assets. This includes issues such as weed and pest management, fire and grazing regimes and the location of watering points when stream-banks are fenced off are likely to come up. The issue of salinity will be of particular importance in some regions. Firewood harvesting and removal of bush-rock at unsustainable levels can also degrade remnant vegetation.

The relationship between farming systems and biodiversity and how they might be change is relevant here, such as the use of herbicides and fertilisers and weed invasion from pastures and crops. For example, it is advisable that fertiliser and chemical spray drift be prevented from adjacent farming areas into native vegetation.

Exercise 10 – Value adding activities

Identify yourself on a line from A-Z, as you did at the start of the workshop. Remember that Z indicates that biodiversity is part of your core business and A indicates that you do not consider it is important.

Selected participants will be asked to share why they are standing where they are on the line. If you have changed since your position on the first day of the workshop, please explain why.

Where WERE you standing on the line?

A _____ Z

Why were you standing where you were on the line?

Has this changed since the start of the workshop? And if so, why?

What do you think successful management that incorporates biodiversity values should involve?

These can be incorporated into your property management. Write down what you are planning to do after finishing the workshop (ie undertake a property planning course, develop a list of native birds on their properties) and share it with the other participants.

My plans after finishing this workshop are:

References

General

Flora and Fauna Notes. A large (over 40) range of notes specifically addressing (i) problem wildlife and (ii) Box-Ironbark vegetation community. Department of Natural Resources and Environment. Web: www.nre.vic.gov.au/notes/

Land for Wildlife -Technical Note Series – cover a broad range of management issues in Victoria. Department of Natural Resources and Environment. Phone 136 186. Web: www.nre.vic.gov.au/notes/

EMS Biodiversity Resource Guide (2003). A CD-Rom produced as part of the NSW Agriculture 'Introduction to Environmental Management Systems in Agriculture'. Available from NSW Agriculture for \$20 (plus \$5 p&h) on 1800 025520 between 8.30 – 4.30 Monday to Friday. Provides a comprehensive set of biodiversity resources at the Commonwealth and State levels including information on:

- Key biodiversity legislation.
- Key biodiversity policies, strategies and international agreements.
- Key biodiversity codes of practice, best management practice guidelines.
- Biodiversity management information – technical.
- Biodiversity management information – flora.
- Biodiversity management information – fauna.
- Biodiversity management information – training.
- Biodiversity management information – incentives.
- Biodiversity management information – equipment and labour.
- Biodiversity management information – catchment.
- Biodiversity support services.

Natural Resources Atlas – an interactive web-based Atlas that allows people to identify a range of NRM issues in your region.
<http://www.ea.gov.au/atlas>

Prograzier – September 2002 issue on biodiversity, including the 6 'Tips and Tools' on managing biodiversity in production landscapes (these are included with the workshop notes)

SGS Technical manual – will be available in mid 2003 and includes chapters on biodiversity, native pastures etc.

Continental or regional scale management

These are available for mammals, reptiles, insects, butterflies, frogs, wildflowers, environmental weeds (SE Australia); native grasses and grassland plants (SE Australia).

Local guides are also available –such as the Plants of Western NSW and Costermans Guide to Native shrubs and trees.

Specific management issues

Whole farm-based

McFarlane, G. and Trewick, K. (2002) *Environmental Best Management Practice on Farms*. Workbook 1 – Farm Self Assessment Sheets. DNRE, Victoria.

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Native bush

Clarke P. (1998) *Your Bushland: Tips for Managing Native Bush Plants in the New England Region*. University of New England, Armidale.

Hobbs R J and Yates C J (2000) (Eds) *Temperate eucalypt woodlands in Australia: Biology, conservation, management and restoration*. Surrey Beatty and Sons, Sydney.

Goldney D and Wakefield S (1997) *Save the Bush Toolkit*. Charles Sturt University, Bathurst.

Includes assessment and management guidelines for native bush, farm watercourses and scattered trees.

Kirkpatrick JB and Gilfedder LA (1999) *Tasmanian Bushcare Toolkit*. Department of Primary Industries, Water and Environment, Hobart.

SGS Tips and Tools (2002) Managing remnant vegetation. Prograzier. September 2002. The six biodiversity tips and tools are provided as part of each participants notes.

Native pastures and grasslands

Barlow, T. (1998) *How to manage native grasslands and grassy woodlands on your property*. Trust for Nature, Victoria.

Eddy D. (2002) *Managing native grasslands: a guide for management of conservation, production and landscape protection*. World Wide Fund for Nature, Australia.
http://www.wwf.org.au/downloads/managing_native_grassland.pdf

Meat and Livestock Australia (2002) *SGS (Sustainable Grazing Systems) Final Report: "Tools for Grazing Strategies" A Triple Bottom Line Report*. Meat & Livestock Australia.

McIntyre, S., McIvor, J.G. and Heard, K.M. (2002) *Managing and conserving grassy woodlands*. CSIRO Publishing, Melbourne.

Mitchell, M. (2002) *Native grasses: an identification handbook for temperate Australia*.

Ross J. (1999), *Guide to Best Practice Conservation of Temperate Native Grasslands*. World Wide Fund for Nature, Australia.

Sharp, D. and Simon, B.K. (2002) *AusGrass. Grasses of Australia – CD Rom and manual*. CSIRO Publishing.

Simpson and Langford (1996) *Managing high rainfall native pastures on a whole farm basis*. NSW Department of Agriculture.

Managing/assessing fauna

Bennett A., Kimber, S. and Ryan, P. (2000) *Revegetation and wildlife. A guide to enhancing revegetation habitats for wildlife conservation in rural environments*. Research report 2/00. Bushcare – National Projects Research and Development Program.

Barrett, G. (2000) *Birds on farms. Ecological management of agricultural sustainability*. Supplement to Wingspan, vol. 10 (4). December 2000.

Includes 10 principles for maintaining and enhancing native birds on farms.

Department of Natural Resources and Environment (1999) *Wildlife in the Box-Ironbark Forests. Linking research and biodiversity management*. Information Kit. DNRE, Melbourne.
<http://www.nre.vic.gov.au/notes/>

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Lindenmayer D., Claridge A., Hazell D., Michael D., Crane M., MacGregor C., Cunningham C. (2002) *Farm Wildlife: Encouraging Wildlife on your Farm*. CSIRO Publishing, Melbourne. (in preparation)

Platt, S.J. (2002) *How to plan wildlife landscapes: a guide for community organisations*. DNRE, Melbourne.

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Triggs, B. (1996) *Tracks, scats and other traces: A field guide to Australian mammals*. Oxford University Press.

Farm watercourse/wetlands

Goldney, D. and Wakefield, S. (1997) *Save the Bush Toolkit. Kits 5 and 6*. Charles Sturt University, Bathurst.

Lovett, S., and Edgar, B. (2002) Planning for river restoration. Fact sheet 9, Land & Water Australia, Canberra.
<http://www.rivers.gov.au>

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1. Managing riparian land.
4. Maintaining in-stream life.
5. Riparian habitat for wildlife.
6. Managing stock.

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Robins, L. (2002) *Managing riparian zones for multiple benefits*. RIRDC, Canberra.

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Straker A. and Platt S. (2002) *Living Systems Resource Kit – biodiversity in property management planning*. CD-Rom. Department of Natural Resources and Environment, Melbourne. Also see www.nre.vic.gov.au/ – follow the prompts to Conservation and Environment, then Biodiversity, then Rural Landscapes.



Further Reading

ANZECC (Australian and New Zealand Environment and Conservation Council) (1996) *National Strategy for the Conservation of Australia's Biological Diversity*, ANZECC, Canberra, URL:
<http://chm.environment.gov.au/strategy/contents.html>.

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Appendix A: Sourcing aerial photographs

Aerial photographs are available for purchasing for all regions of Australia. In most regions they are flown fairly regularly, so will provide relatively up-to-date information. For example, in NSW photos of every part of the State have been taken every four years since the 1950s. In areas where recent photos are not available, the older ones still provide a snap-shot of the vegetation at the time the photo was taken. Each standard photo covers approximately 36 square kilometres and any photo can be enlarged to show details of individual property boundaries.

The National Library has a collection of approximately 800,000 black and white aerial photographs housed in the Map Reading Room (Lower Ground 1) (see <http://www.nla.gov.au/map/aerialphoto>). The aerial photographs covering most of Australia were taken between 1928 and 1987. The collection comprises Commonwealth photography flown by the Royal Australian Air Force (RAAF), Division of National Mapping, Bureau of Mineral Resources (BMR) and the Australian Surveying and Land Information Group (AUSLIG), now called the National Mapping Division. The collection is arranged and indexed according to the Australian 1:63 360 topographic sheet numbering system. Aerial photographs can be accessed in the Map Reading Room. They are not available for interlibrary loan although copies can be ordered. The Map Reading Room also houses a collection of photomaps, photomosaic, and orthophoto maps.

Internet sites

It is possible to access a range of aerial photographs via the internet.

Commonwealth

National Mapping Division – Aerial Photography

<http://www.auslig.gov.au/products/photos/>

Outlines National Mapping Division's aerial photography service. Contains online catalogue of flight line diagrams at the national scale to select photography and a link to United Photo and Graphics for information on products, ordering, and payment.

National Archives of Australia

<http://www.naa.gov.au/fsheets/fs191.html>

Lists the major aerial photograph collections held by the National Archives.

Australian Capital Territory

Australian Capital Territory Land Information Centre

<http://www.palm.act.gov.au/actlic/index.htm>

The ACT Land Information Centre (ACTLIC) is responsible for the programming, flight planning, acquisition and reproduction of aerial photography over Canberra and the surrounding region.

New South Wales

Land and Property Information NSW – Airview

<http://www.lpi.nsw.gov.au/airview/>

Airview is the aerial photographic viewing and ordering system for NSW. The web site includes suburb and spatial searches, and details on ordering photographs.

Land and Property Information NSW – Maps and Aerial photos

<http://www.lpi.nsw.gov.au/maps>

Outlines their range of map and survey products available.

Victoria

G. I. Connections – VSDD – Aerial Photo Library

<http://www.giconnections.vic.gov.au/content/hardcopy/aerial/aerialph.htm>

Contains collection and contact details for the library.

Queensland

The Queensland Department of Natural Resources and Mines

Aerial Photography

http://www.nrm.qld.gov.au/property/mapping/aerial_photography.html

Contains details of photo coverage, products available and prices.

South Australia

Department for Environment and Heritage

Environment and Geographic Information

<http://www.denr.sa.gov.au/mapland/aerial.html>

Describes aerial photography programs, products and services. Includes a Digital Image Data Base of South Australia. Environment and Geographic Information also maintains an historical photographic library of aerial prints from 1949.

A CD-Rom called PanAIRama can be purchased for \$45 from Resource Information (1800 44 0133) which enables purchasers to view their own property and destinations of their choice. Once an area has been selected a high quality enlargement up to 3 metres wide can be ordered.

Western Australia

Department of Land Administration

Central Map Agency

[http://www.dola.wa.gov.au/home.nsf/\(FrameNames\)/Aerial+Photography](http://www.dola.wa.gov.au/home.nsf/(FrameNames)/Aerial+Photography)

Describes the Western Australia collection and contains an index of completed photography. Also links to SkyView WA – an online aerial photography viewing and ordering program.

Northern Territory

Lands Planning Environment Northern Territory Government

Aerial Photography Archive of the Northern Territory

<http://www.lpe.nt.gov.au/airphoto/index.html>

Links directly to a map of the Northern Territory, which displays aerial photograph coverage. Flight details from 1979 and photo images from 1999 can be seen and products ordered.

Useful contact addresses

Australian Surveying and Land Information National Mapping Division (formerly AUSLIG), GeoScience Australia

PO Box 2,

BELCONNEN ACT 2616

Scrivener Building, Dunlop Court, Fern Hill Park

BRUCE ACT 2617

Telephone: (02) 6201 4201; URL: <http://www.auslig.gov.au>

United Photo and Graphics (UPGS)

PO Box 407,

BLACKBURN VIC 3130

4/2 Apollo Court

BLACKBURN VIC 3130

Telephone: (03) 9877 3922; Facsimile: (03) 9894 2971

Email: info@unitedphoto.com.au; URL: <http://www.unitedphoto.com.au>

Appendix B: Whole farm planning

Property Management Planning (PMP) encourages land managers to undertake an integrated approach to farm management. It aims to provide land managers and their families with skills to develop a farm plan that incorporates the economic, social and physical aspects of farming.

The National PMP Program finished on June 30, 2001. It consisted of a different program in each state (Tasmania – Farmwise; Victoria – FarmSmart; NSW – Farming for the Future; NT/SA – Property Management Planning; Queensland – Futureprofit; WA – Better Business), who provided workshops on strategic planning.

As of November 2002, Queensland appears to be one of the few states that is actively pursuing PMP at a state level (see <http://www.dpi.qld.gov.au/futureprofit/>). This web-site provides information that is broadly applicable elsewhere, but does not address the issue of where local participants can take a PMP course outside of Queensland. In Victoria, PMP is being offered at a regional level, but no state program appears to exist.

Some educational/training institutions are offering PMP/whole farm planning courses such as NSW Agriculture in Total, NSW and the University of Melbourne Institute of Land and Food Resources in Victoria. Farm planning software such as Farmap and Pinpoint are also available to assist farmers develop property management plans and undertake financial and other analysis.

Environmental Management Systems, which include a planning component, appears to currently being promoted as the best way to integrate multiple objectives. The development of Environmental Management Systems (EMS) is being supported under the Natural Heritage Trust extension by the *Environmental Management Systems Incentive Program*. This was allocated \$25 million in the 2002 budget, spread over five years, to reimburse farmers up to \$3,000 for a very broad range of activities associated with the development and implementation of an EMS, including native vegetation management works. The Agriculture, Fisheries, Forestry Australia (AFFA) web-site hosts an EMS Navigator, which can be found in the Natural Resource Management section at <http://www.affa.gov.au/index.cfm>.

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