TO CONTENTS

Native vegetation on farms survey 1996

A survey of farmers attitudes to native vegetation and landcare in the wheatbelt of Western Australia

Suzanne Jenkins for
Agriculture Western Australia and
Department of Conservation and Land Management

Research Report 3/98

National Research and Development Program on Rehabilitation, Management and Conservation of Remnant Vegetation

Land & Water Resources Research & Development Corporation

Bushcare

TO CONTENTS

TO PREFACE

Native vegetation on farms survey 1996

A survey of farmers attitudes to native vegetation and landcare in the wheatbelt of Western Australia

Reprinted from Resource Management Technical Report 64 (ISSN–0729–3135) by the Spatial Resource Information Group of Agriculture Western Australia

Suzanne Jenkins for

Agriculture Western Australia and

Department of Conservation and Land Management

National Research and Development Program on Rehabilitation, Management and Conservation of Remnant Vegetation

Research Report 3/98

Natural Heritage Trust

A better environment for Australia in the 21st Century

TO CONTENTS

Published by: Environment Australia: Biodiversity Group

GPO Box 636
Canberra ACT 2601
Telephone (02) 6250 0200
Facsimile (02) 6250 0399

This project was supported by Environment Australia through the Bushcare Program and by LWRRDC. For information relating to the Bushcare Program please contact Environment Australia.

Author: Suzanne Jenkins for
Agriculture Western Australia and
Department of Conservation and Land Management

The project was overseen by a Steering Committee comprising: Greg Beeston, Agriculture Western Australia; Richard Hobbs, CSIRO; Penny Hussey, Department of Conservation and Land Management; and Geoff Syme, CSIRO.

For further information on the project please contact: G Beetson 08 9368 3732
or P Hussey 08 9334 0455.

Publication data: Jenkins, S. (1998) *Native Vegetation on Farms Survey 1996 – A survey of Farmers Attitudes to Native Vegetation and Landcare in the Wheatbelt of Western Australia*. National Research and Development Program on Rehabilitation, Management and Conservation of Remnant Vegetation, Research Report 3/98.

Note: This report has been previously published as Resource Management Technical Report 64 (ISSN–0729–3135) by the Spatial Resource Information Group of Agriculture Western Australia.

Design and typesetting: WhizzbangArt

Cover photo: Courtesy of Environment Australia

Printed by: Union Offset

ISBN: 0 642 54003 9

Preface

Clearing of native vegetation from much of Australia's prime agricultural land has caused the widespread fragmentation of natural ecosystems, reducing their viability and threatening maintenance of native flora and fauna and the ecological processes upon which productive rural landscapes depend. The degradation of ecosystem processes in the agricultural zone is the result of a particular suite of ecological, economic, social and institutional circumstances. These must be understood before effective policies and programs to combat degradation can be established. Recognising this, the Land and Water Resources Research and Development Corporation (LWRRDC) funded a review entitled *Remnant Vegetation in the Rural Landscape*; a consultancy report which highlighted:

- the difficulty in planning and conducting essential long-term ecological research due to the annual funding cycle of existing programs; and
- the lack of an adequate understanding of the socio-economic factors which influence land managers' decisions regarding remnant vegetation.

In response to the findings of the review, Environment Australia and LWRRDC joined together to establish a national program of research and development on the rehabilitation, management and conservation of remnant native vegetation. The program, which commenced in 1994, aims to assist government agencies, community groups and landholders to better manage and protect remnant native vegetation through application of improved knowledge and understanding gained from research. The program has a strong emphasis on practical outcomes in managing remnant native vegetation and promotes the development of effective links between vegetation managers and researchers.

The program has two main themes: ecological research and socioeconomic research. A range of projects was funded in 1994 to examine different aspects of the ecology of native vegetation, and develop practical methods for better management by individual landholders. A number of projects, primarily based in the extensively cleared and highly degraded woodland ecosystems, identify the key processes by which different types of disturbance influence the long term maintenance and conservation of remnant native vegetation. The projects develop and demonstrate practical measures to reconstruct, rehabilitate or manage remnant vegetation in highly degraded or altered landscapes.

In addition to developing a broadly-based ecological understanding, it is also important to understand the range of socio-economic issues which influence the protection and sustainable management of remnant native vegetation. Projects funded under this component range from identifying the market and non-market values of, and the attitudes of rural landholders to, remnant vegetation. Projects also focus on the development of improved legislation, incentives and effective mechanisms/systems that would assist landholders to retain native vegetation on private land. The range of projects will contribute significantly to an understanding of the socio-economic issues influencing the protection and management of remnant native vegetation.

The research and development program, part funded by Environment Australia under Bushcare, is already providing a valuable information base on the ecological, economic and social values of remnant vegetation. It is highlighting the importance of ensuring that off-reserve nature conservation measures are supported by private landholders and that economic and ecological values are included in the decision making process. The series of papers arising from this program is aimed at ensuring widespread dissemination of the research results in the expectation that the knowledge gained from this investment will lead to improved management of native vegetation and therefore, sustainable land

management and the conservation of biodiversity. This paper reports on the changes in attitudes to native vegetation over 10 years and the effectiveness of funding schemes in changing attitudes and prompting action.

For more information about the research and development program please contact LWRRDC or Environment Australia. For information about assistance available under Bushcare for management of remnant vegetation please contact Environment Australia.

Phil Price, LWRRDC
Andrew Campbell, Environment Australia

Contents

Executive summary 1

1: The survey 1

2: Aim 1

3: Results 1

1. Introduction 4
- 1.1: The survey 4
- 1.2: Funding and implementation 4
- 1.3: Aim 4

2. The shires 6
- 2.1: Location 6
- 2.2: Climate 6
- 2.3: History 6
- 2.4: Remnant vegetation in the shires 7

3. Historical and ecological context of the survey 13
- 3.1: Flora and fauna of the wheatbelt 13
- 3.2: The history of the settlement and vegetation clearing 14
- 3.3: Government policy on land development and clearing 14
- 3.4: Land degradation – erosion and salinisation 16
- 3.5: Soil salinisation and the role of native vegetation in prevention and remediation 16
- 3.6: Values of remnant and replanted vegetation 17
- 3.7: Sustainable production 18
- 3.8: Landcare 18

4. Survey contents and method 19
- 4.1: Survey content 19
- 4.2: Sample size and selection 19
- 4.3: Survey method 19
- 4.4: Data treatment 20
- 4.5: Presentation of results 20

5. Demographics 21
- 5.1: Farm type 21
- 5.2: Farm size 21
- 5.3: Gender of participants 21
- 5.4: Age of farmers 21
- 5.5: Level of formal education 22
- 5.6: Organisation affiliation or membership 22
- 5.7: Income from property 22
- 5.8: Length of property ownership 22

MORE CONTENTS

6. Farming experience and farm plans 24
6.1: Farming experience 24
6:2: Farm plans 24

7. Native vegetation, replanting and land degradation 26
7.1: Land degradation 26
7.2: Native vegetation 27
7.3: Use of bush 27
7.4: Clearing of native vegetation 1987–1996 26
7.5: Plans to clear in the next ten years 27
7.6: Replanting 29
7.7: Replanting advice 32
7.8: Grants for replanting and fencing native vegetation 33
7.9: Health of native vegetation on farms 35

8. Attitudes to and management of native vegetation 36
8.1: Attitudes of farmers to native vegetation 36
8.2: Benefits or disadvantages of bush in the shire 38
8.3: Native vegetation management 38
8.4: Bushland and management advice 41
8.5: Percentage of farm to be left as bush 41
8.6: Reasons for leaving bush 43
8.7: Endangered plants or animals 43

9. Incentives for bushland care and replanting 44
9.1: Incentives to protect and replant 44
9.2: Incentives to replant more local native vegetation 44
9.3: Incentives to better protect/manage bush 44
9.4: Fencing grants for remnant vegetation 45
9.5: Responsibility of various groups for the management of and provision of money for bushland on farms 45

10. Farmers' comments
10.1: Farmers' comments 47
10.2: Land degradation 47
10.3: Remnant vegetation 47
10.4: Flora and fauna 48
10.5: Clearing 49
10.6: Replanting 49
10.7: No-tillage cropping 50
10.8: Landcare 50
10.9: Women 51
10.10: Whittington interceptor banks 51
10.11: Fencing grants 52
10.12: Labour and financial support 53
10.13: Tax incentives 53
10.14: Government departments 54

11. A comparison of the survey data and agricultural census data 55
11.1: The agricultural census 55

MORE CONTENTS

12. Conclusions 56
12.1: The survey 56
12.2: Changes in farmers' attitude in the last ten years 56
12.3: The effectiveness of funding schemes for landcare work 56
12.4: Factors promoting and retarding vegetation management 57
12.5: Information on landcare and its perceived value 57
12.6: Appraisal of the survey 58

13. References 59

Appendix A: Farmers' comments 62

Appendix B: Letter of notification 72

Appendix C: The survey 73

Figures

Figure 1: The location of the shires included in the study. . . . . .
Figure 2: Remnant vegetation in the shire of Pingelly. . . . . .
Figure 3: Remnant vegetation in the shire of Lake Grace. . . . . .
Figure 4: Remnant vegetation in the shire of Dumbleyung. . . . . .
Figure 5: Remnant vegetation in the shire of Kellerberrin. . . . . .
Figure 6: Remnant vegetation in the shire of Tammin. . . . . .
Figure 7: A summary of clearing restrictions introduced May 1995. . . . . .

BACK TO CONTENTS

Executive summary

1. The survey

The Native Vegetation on Farms Survey 1996 was performed to assess the attitudes of farmers to a number of issues related to existing native vegetation on farmland, the replanting of vegetation on farms and land degradation. Research has shown that it is important for a proportion of all farmland to have some native vegetation for ecological stability, to regulate hydrological processes and for long-term sustainablity of farm production. Extensive clearing of farms for agriculture has resulted in severe disruption of natural systems including local extinctions of flora and fauna, the alteration of groundwater movements, increasing soil salinisation, wind and water erosion and soil structure degradation.

The survey was conducted in early 1996 in the southern Western Australian wheatbelt shires of Pingelly, Lake Grace, Dumbleyung, Tammin and Kellerberrin. One hundred and forty-five farmers were surveyed, the majority of whom farmed wheat and sheep. It is, in part, a repeat of a survey that was performed in 1986 by Coates (1987) concerning similar issues. It is anticipated that the findings of this survey will be of interest to a variety of individuals and groups involved with farming, revegetation of farmland, conservation and policy making.

2. Aim

The aim of the survey was to gain information on the following issues:

1. the change, if any, in farmers' attitudes to remnant vegetation over the last ten years
2. the effectiveness of funding schemes for landcare work, in changing attitudes and prompting action
3. the factors that have promoted remnant vegetation management and the factors that have retarded it
4. the sources of information on landcare accessed by farmers and its perceived value
5. the reliability of the Agricultural Census data as it relates to this field.

3. Results

Changes in farmers' attitude in the last ten years

A questionnaire used by Coates (1987) in the 1986 survey, to provide a direct measurement of the attitudes of farmers towards native vegetation, was administered again in this survey. It contained a series of statements about native vegetation and requested participants to say whether they agreed with a statement or not. (Section 10 contains a list of the statements and the responses). In 1986, responses to the statements indicated a high level of awareness of the ecological and land conservation values of bush on farms and this was repeated, in 1996. This indicated that their level of awareness was unchanged.

However, from speaking to the farmers, it was clear that there had been changes in their attitudes to bushland on farms. Repeatedly, people said that they had changed their outlook over the last 5–10 years on a variety of matters pertaining to native vegetation and landcare. They attributed these changes to their greater knowledge of the problems of land degradation, caused by overclearing and to the fact that the problems were so extensive and obvious that they were prompted to seek information to address them. The clearest indication of the changes in attitudes to native vegetation were the changes in behaviour of farmers indicated by the survey data and the actions that they were taking on their farm. In 1986, only 64% of farmers had replanted trees and shrubs on their farm, while, in 1996, 84% of farmers had done so (Graph 9). The remainder indicated that they would be

doing so in the future. The number of people who chose to plant non-native species had decreased by over half. Uses of bushland had changed in the last ten years (Table 11), with many fewer (41% compared to 71%) saying that they used their bushland for the grazing of stock. Other destructive and/or devaluing uses of bush such as using it as a site for rubbish disposal or as a source of gravel had decreased by more than half. All farmers recognised that bush required some management to prevent it from deterioration (Graph 15) and that sheep were destructive to bush. The percentage of farmers who had fenced bush had increased by almost threefold in three of the shires.

The effectiveness of funding schemes for landcare work

The survey aimed to discover the effectiveness of funding schemes in prompting landcare work implementation and in changing attitudes regarding remnant vegetation. The funding schemes that currently exist are in the form of grants for part of the cost of replanting and fencing of bush and 100% tax deductions on financial outlay for landcare works.

Only 15% of farmers had received replanting grants and 26% had received fencing grants, compared with 84% who had replanted and 78% who had fenced some or all of their bush. This shows that farmers must be motivated to perform these works and do so in the absence of grants. Of the farmers who received grants, around 60% said that they would have done the work regardless of a grant but they wished to emphasise that they would not have been in a financial position to do it for at least one, possibly a number of years. Better financial assistance for fencing and replanting was listed by over 70% of farmers as desirable to prompt more landcare work. Many said that they had limited time and money to devote to landcare as excessive expenditure would threaten the economic viability of their farm.

Of farmers who responded 83% said that they thought that the government should provide some sort of financial assistance for fencing bushland. Of these, 52% were happy to agree to a thirty year contract for the protection of their bush, 11% said they would prefer a negotiable contract that would allow stock shelter and emergency grazing and 13.5% considered contracts a disincentive to obtaining grants at the present time.

Tax deductions of 100% for landcare work were considered inadequate by many people. They said that they were inadequate compensation considering the time spent on the work and the fact that direct tax deductions could be gained from many other commodities on the farm that did not involve uncompensated work. These were chosen preferentially by farmers who wished to offset a large tax bill. It was considered that 150–200% tax deductions would act as real incentives. Some farmers (6%) said that they would prefer such a tax deduction to a grant for fencing.

Factors promoting and retarding vegetation management

The importance of vegetation in regulating the level of the watertable is the most obvious factor encouraging farmers to manage remnant vegetation. In all the shires surveyed, a significant proportion of farmland was salt affected as a result of the rising watertable. Land degradation is too obvious a problem to ignore and farmers realised the value of keeping healthy remnant bush to minimise adverse local hydrological processes. It is recognised that it is much easier to look after existing bush than to replant it.

The growth of the landcare movement is another factor that is promoting management of bush on farms. Of farmers interviewed, 64% were members of catchment groups, which aim to manage the vegetation in the area and all remaining farmers were aware of the existence of the ‘Landcare’ movement and its objectives.

The greatest factor retarding bushland management is a lack of available information on appropriate management practices related to different vegetation assemblages; managing degraded areas of bush; the role of fire in different bush types; and the presence of rare and endangered species. Many farmers said that they had found it difficult to locate anyone within the government departments who had knowledge on these issues. Half of participants said that they thought that a greater availability of information on bushland management would be an incentive for them to better manage bush. Farmers (31%) said that they would like a visit from someone with expertise on bushland management to assist them to develop a long-term management plan. Of farmers interviewed, 36% said that they did not know whether they had endangered plants or animals in their bush.

Another factor retarding the better management of bush, in the opinions of many of the farmers surveyed, is a lack of commitment on the part of the government to provide financial assistance and personnel for this purpose. The ill-conceived government policy on clearing in the past, is considered by these individuals, to be the main reason why bushland is in such a poor condition.

Information on landcare and its perceived value

As already discussed, a paucity of available information on bushland management is impeding better management of bush. This situation extends to all areas of landcare. As well as issues related to bushland management farmers identified the following aspects of landcare work on which they thought information was inadequate or not readily available:

- local hydrology
- suitable species to plant on different soils
- knowledge of the species that occurred locally in the region
- plant species that could be planted for animal habitat
- methods of re-establishing an understorey in degraded bushland
- alley farming in particular localities.

The Agricultural Census

The Australian Bureau of Statistics (ABS) conducts an annual survey of farms. Some of the questions asked in the survey are similar to those in this survey. A comparison was made between the data from the 1993–94 ABS survey and the corresponding questions in the 1996 Native Vegetation Survey. The first comparison was made between the total amount of revegetation in each shire for each survey. There is a reasonable consistency between the results obtained in the two surveys considering the relatively small sample size in the 1996 survey. The second comparison was made between the percentage of farmers in each of the shires who said that they had revegetated and fenced remnant vegetation in the two surveys. There was a relatively large discrepancy between the results obtained in both surveys with the results obtained in 1996 showing 35–50% increases. The small sample size of the 1996 survey may account for some of the variability

BACK TO CONTENTS

1. Introduction

1.1 The survey

The Native Vegetation on Farms Survey 1996 was performed to assess the attitudes of farmers to a number of issues related to native vegetation on farmland, the replanting of vegetation on farms and land degradation. Research has shown that it is important for a proportion of all farmland to have some native vegetation for ecological stability, to regulate hydrological processes and for long-term sustainability of farm production. Extensive clearing of farms for agriculture has resulted in severe disruption of natural systems including local extinctions of flora and fauna, the alteration of groundwater movements, increasing soil salinisation, wind and water erosion and soil structure degradation.

The survey was conducted in early 1996 in the southern Western Australian shires of Pingelly, Lake Grace, Dumbleyung, Tammin and Kellerberrin. Figure 1 shows the location of these shires. One hundred and forty-five farmers were surveyed, the majority of whom farmed wheat and sheep. It is, in part, a repeat of a survey that was performed in 1986 addressing similar issues. It is anticipated that the findings of this survey will be of interest to a variety of individuals and groups involved with farming, revegetation of farmland, conservation and policy making.

1.2 Funding and implementation

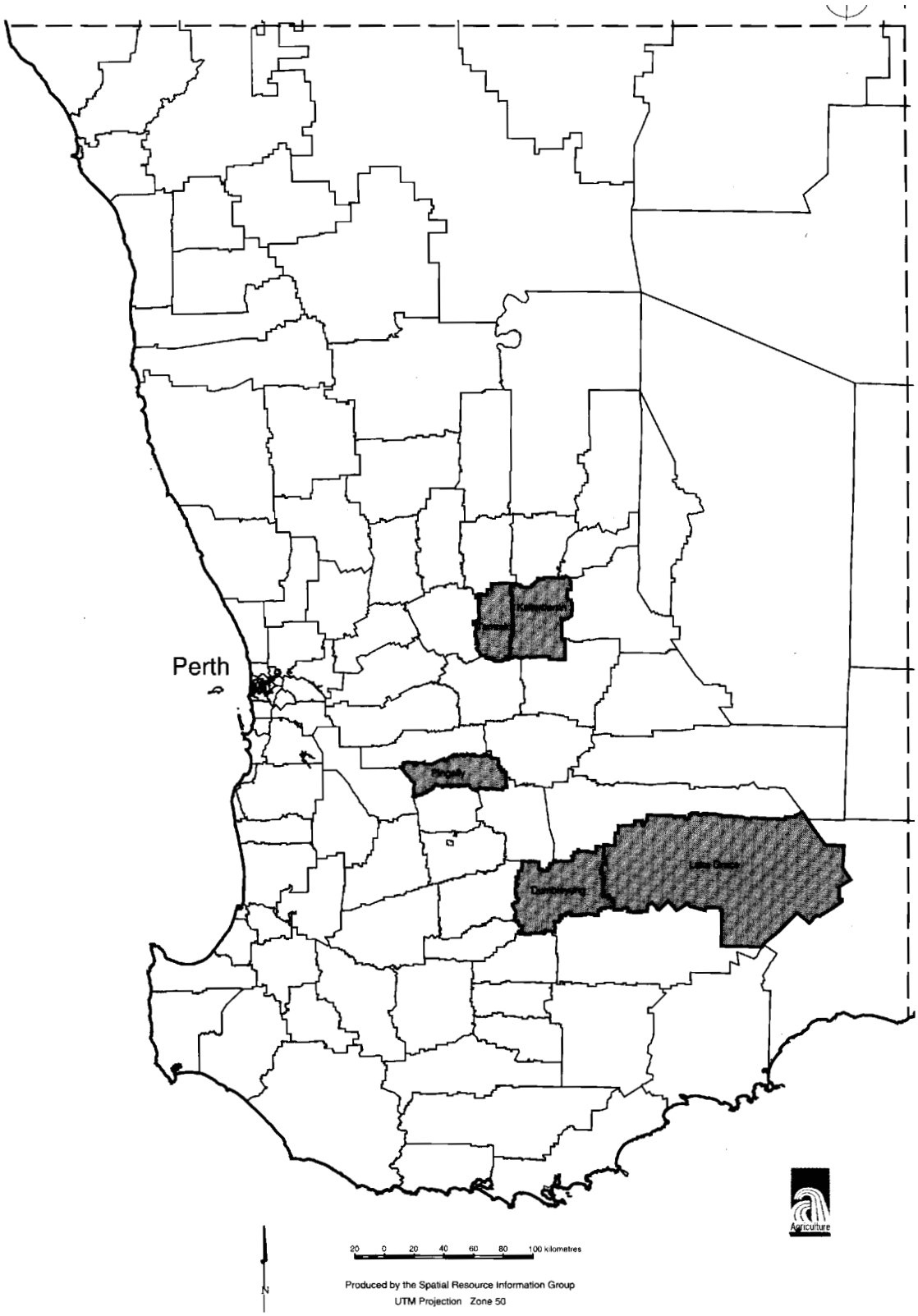
This survey was funded by the Land and Water Resources Research Commission and the Australian Nature Conservation Agency (now Environment Australia). It has been coordinated by the Spatial Resources Information Group of Agriculture Western Australia, the Department of Conservation and Land Management, the CSIRO Division of Wildlife Ecology and the CSIRO Australian Research Centre for Water and Society.

1.3 Aim

The aim of the survey was to gain information on the following issues:

1. the change in farmers attitude, if any, to remnant vegetation over the last ten years
2. the effectiveness of funding schemes for landcare work, in changing attitudes and prompting action
3. the factors that have promoted remnant vegetation management and the factors that have retarded it
4. the sources of information on landcare accessed by farmers and its perceived value
5. the reliability of the Agricultural Census data as it relates to this field.

Figure 1: The location of shires included in the survey



BACK TO CONTENTS

2. The shires

2.1 Location

The shires of Pingelly, Lake Grace, Dumbleyung, Kellerberrin and Tammin are all located in the area known as the wheatbelt of the south-west of Western Australia. The shires of Pingelly, Lake Grace, Kellerberrin and Tammin are found within the Avon River catchment and the shire of Dumbleyung is mainly found within the Blackwood River catchment. The location of each shire is shown in Figure 1.

2.2 Climate

The wheatbelt experiences a Mediterranean climate with mild winters. The mean minimum winter temperatures are around 6°C and the mean summer maximums around 35°C. Around 75% of the annual rainfall occurs in the cooler months from April through to September (Lefroy *et al*, 1992). Table 1 indicates the mean annual rainfall in the shires surveyed.

Table 1: The mean annual rainfall in each of the surveyed shires (from Bureau of Meteorology, 1993).

Shire	Mean annual rainfall
Pingelly	455
Lake Grace	352
Dumbleyung	438[1]
Kellerberrin	331
Tammin	365[2]

1. From Wagin. 2. From Cunderdin

2.3 History

Prior to European settlement the areas included in the study, were inhabited by Aboriginal people who pursued the hunter-gatherer lifestyle, typical of these people throughout Australia. Fire was used by the Aborigines as a management tool to regulate populations of particular plants and animals on which they relied for food. This traditional firing of the bush, which had played an important role in the ecology of the land, ceased when Europeans settled the land and displaced Aboriginal people. The fire frequency of burning that occurred in particular regions is not known today (Main, 1987).

Pingelly

This area was used for stock grazing from the 1830s. In the 1880s, the area was exploited for the harvest of mallet bark which was used in the tanning industry, and a sandalwood plantation was unsuccessfully attempted (McArthur, 1991). The town of Pingelly came into existence in the early 1890s and wheat farming began in the area (Jarvis, 1986).

Lake Grace

The first land selection occurred in the Shire of Lake Grace in 1907 near the current town site of Lake Grace. In the early 1920s, the most productive areas around Lake King, Lake Camm, Lake Varley and Mount Madden were settled as part of the soldier and immigrant scheme. Research into the addition of trace elements to the lighter or marginal soils by the Newdegate Agricultural Research Station in the 1950s enabled successful cropping of this country. Clearing of light land for cropping began in the early 1960s (Wheatbelt Development Commission, 1996).

Dumbleyung

The first pastoralists arrived in Dumbleyung in the late 1870s and continued to arrive, but only in small numbers, until 1900. From 1900–1915, there was a greater influx of people and wheat and oat production had started (Klemm, 1983).

Kellerberrin

The first settlers in the Kellerberrin area were also pastoralists in the 1860s. They grazed sheep on the halophytic vegetation along the salt lake chains and in the York gum-jam country in winter. Conditional development grants of land by the government in the early 1890s encouraged

land holders to embark on agricultural rather than pastoral activity. The introduction of phosphatic fertilisers from 1888 greatly increased yields and made cropping attractive. By the year 1906, cropping was firmly established (McArthur, 1991)

Tammin

The settlement of Tammin followed a similar pattern to Kellerberrin.

2.4 Remnant vegetation in the shires

Clearing of each of the shires has left only small areas of bushland. These are known as fragments or remnants. Most of these are very small and insufficient to adequately preserve the integrity of the bushland ecosystem that existed prior to fragmentation. (Section 4.1 discusses fragmentation of bushland). The area of remnant vegetation in each of the shires (on private and public land), the percentage area of native vegetation of each shire over the whole shire (public and private land) and on private land only (all recorded in 1994) is presented in Table 2. The data was calculated by the Spatial Resources Information Group, Agriculture Western Australia. Figures 2–6 show the area of remnant vegetation in each shire which is on private and public land.

Table 2: The area of remnant vegetation on private and public land in each of the shires and the percentage area of vegetation in the shire as a whole, and on private land (from Spatial Resources Information Group, Agriculture Western Australia).

Shire	Area of shire (ha)	Area of remnant vegetation (ha)		Native vegetation (% of land)	
		Private land	Public land	Whole shire (private & public land)	Private land
Pingelly	128,552	4,774	7,461	9.5	3.71
Lake Grace	1,031,972	146,613	642,820	76.5	14.21
Dumbleyung	253,816	17,392	14,830	12.7	6.85
Kellerberrin	191,970	13,664	1,838	8.08	7.12
Tammin	110,090	1,793	1,754	3.22	1.63

Figure 2: Remnant vegetation in the shire of Pingelly

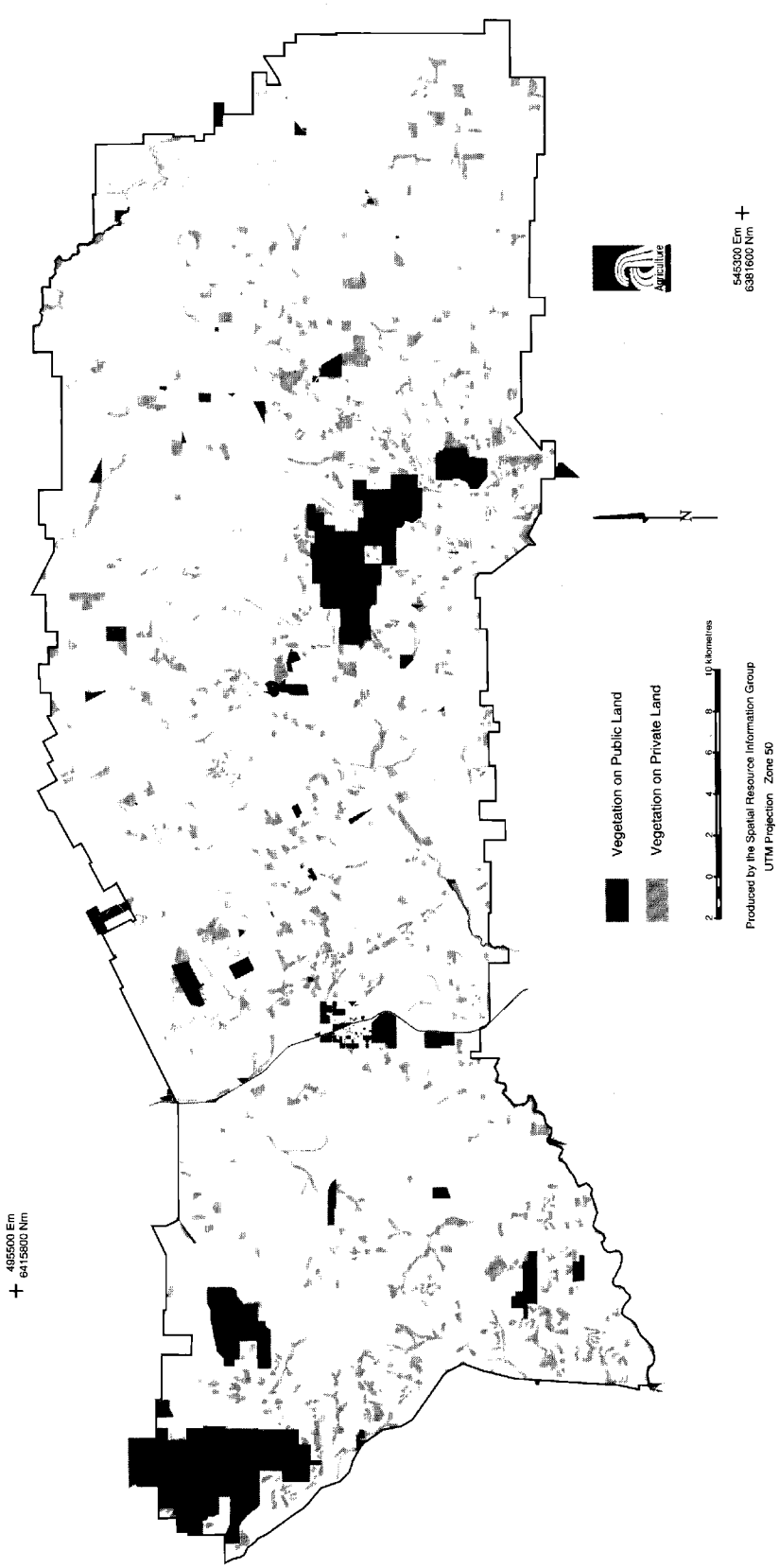


Figure 3: Remnant vegetation in the shire of Lake Grace

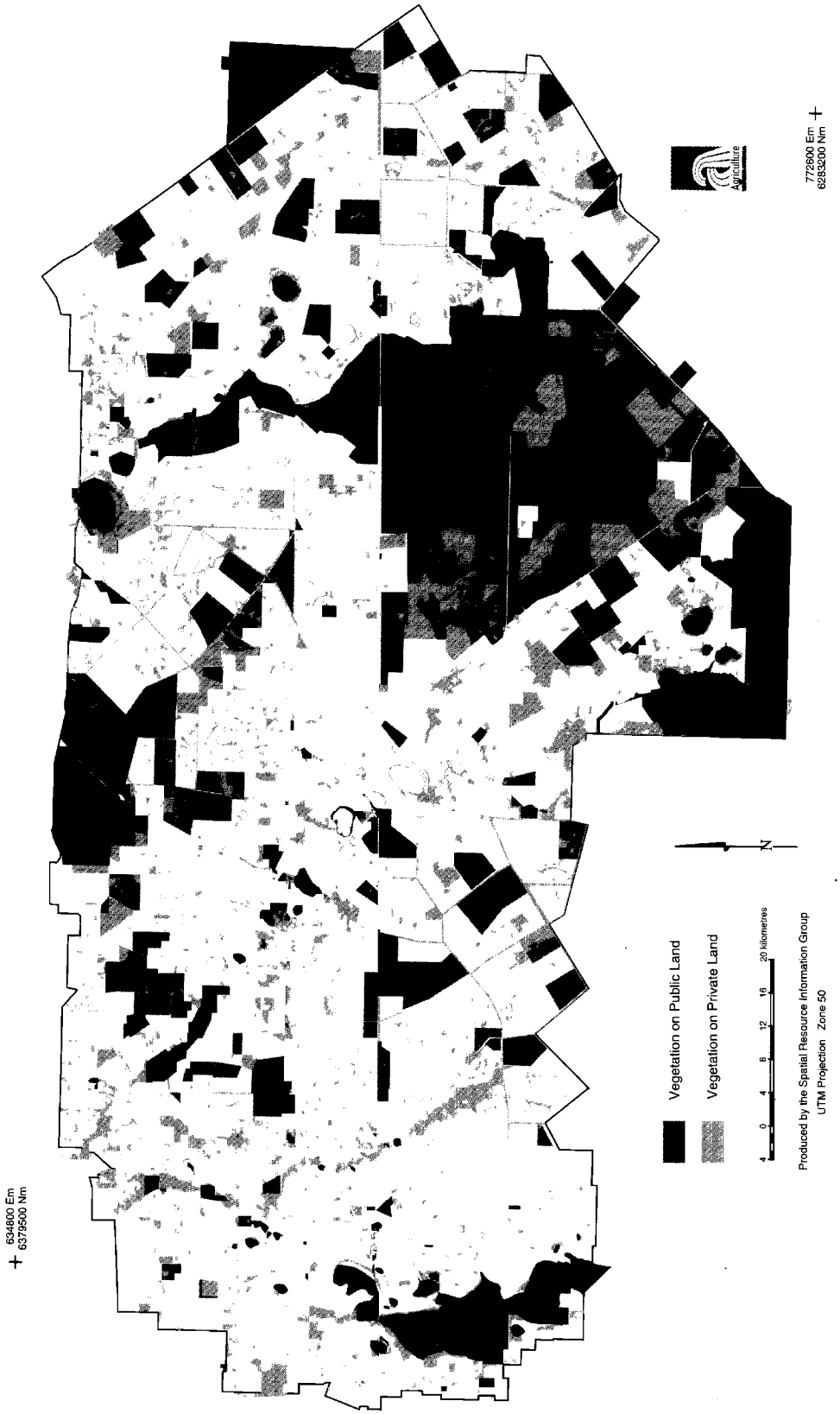


Figure 4: Remnant vegetation in the shire of Dumbleyung

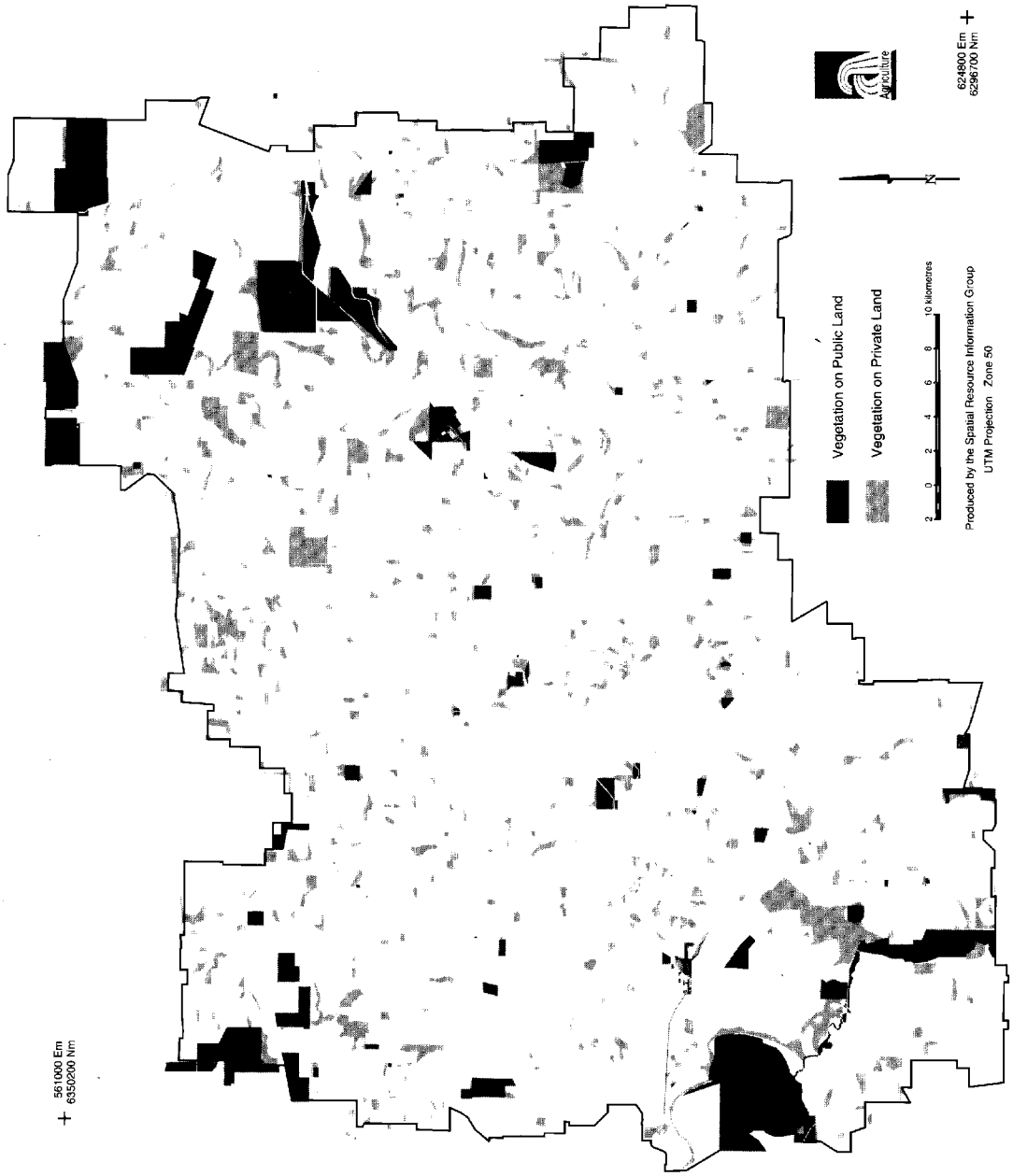


Figure 5: Remnant vegetation in the shire of Kellerberrin

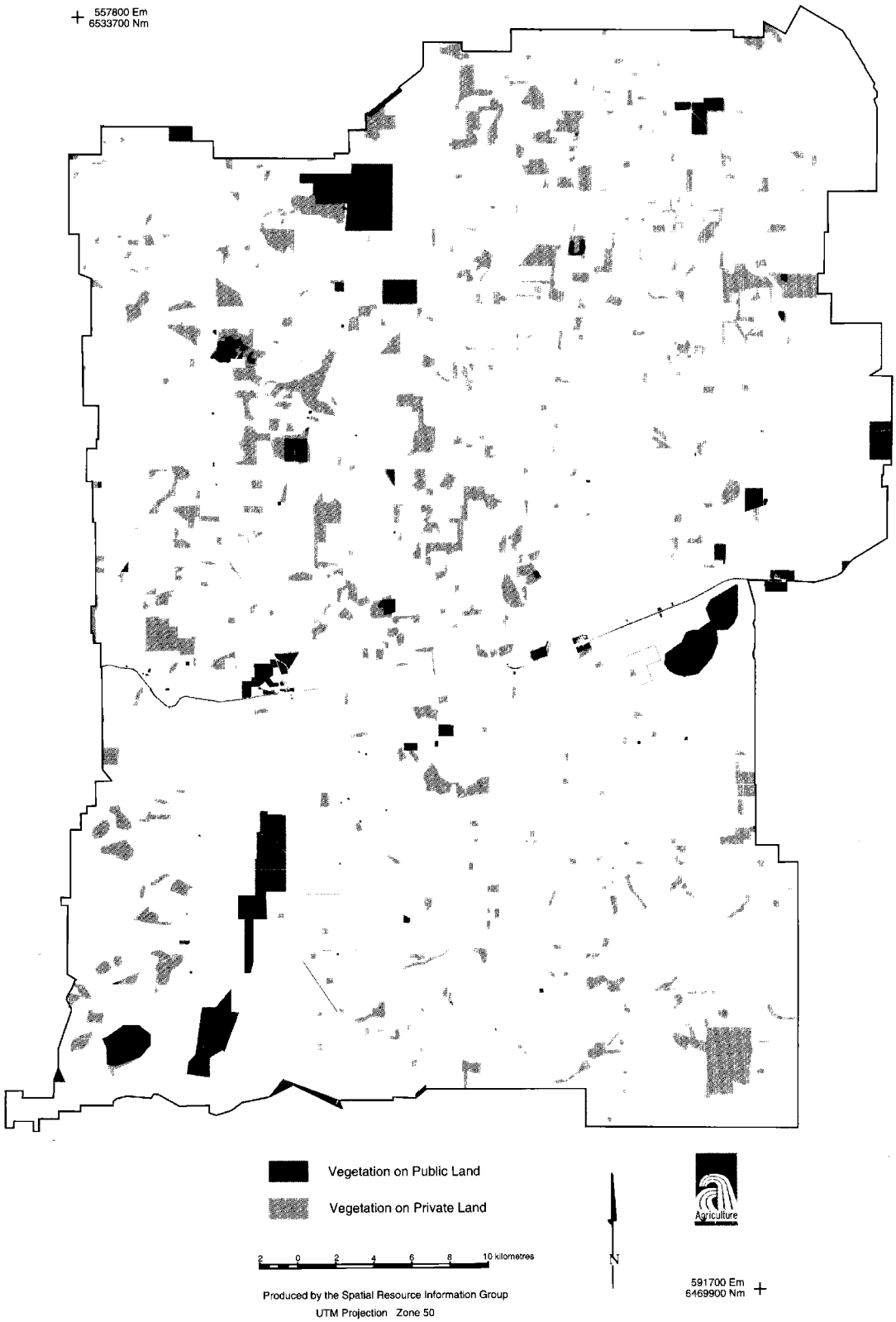
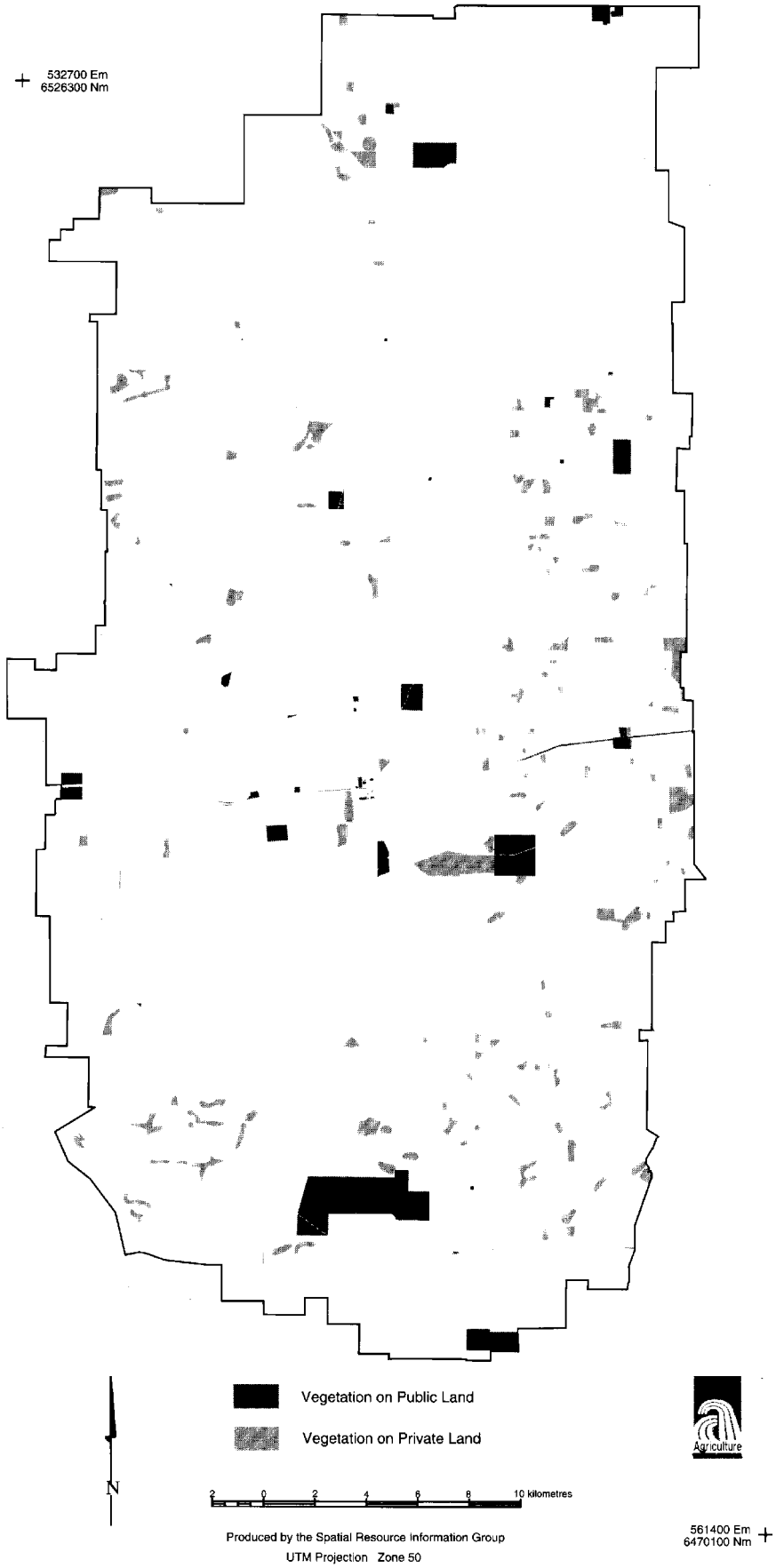


Figure 6: Remnant vegetation in the shire of Tammin



3. Historical and ecological context of survey

3.1 Flora and fauna of the wheatbelt

Prior to European settlement, Western Australia's wheatbelt area was covered by a complex mosaic of woodland, mallee, shrublands, granite rock and salt land plants (Hobbs and Wallace, 1991). Clearing has left only remnant areas, most of which are quite small. Remnants designated as reserves are among the largest and have a mean size of 114 ha (Wallace and Moore, 1987). The type of remnants which remain are not a proportional representation of the original vegetation because of the preferential clearing of particular vegetation types, particularly woodland, which generally grew on the most fertile soils (Hobbs, 1992). Only a few per cent of some of the original woodland types remain (Beard and Sprenger, 1984).

Remnant areas of bush are subject to a range of disturbances which undermine the integrity of the original ecosystem. Edge creation allows the fragment to be exposed to the drying effects of wind, the input of weed seeds and in agricultural lands the input of fertilisers which can alter the soil chemistry and disadvantage vulnerable plants. The clearing of vast areas of natural vegetation can alter the regional climate by altering the reflective qualities (albedo) of the landscape and by the altered input of moisture into the air from evapotranspiration when native plants are replaced by annual crop or pasture species. Fire frequency and intensity is changed and consequently, the natural cyclical succession of assemblages of species, as recovery proceeds, is altered. Understorey in some fragments is lost as a result of grazing and trampling by stock. These changes, combined with the decrease in area of vegetation types, has resulted in the loss of plant and animal species at particular localities, or in some cases extinction.

The wheatbelt region has a diverse flora and fauna despite the habitat loss. It is amongst the most diverse in the world with many species unique to the region (Coates, 1987). There is a high density of rare and geographically restricted plant species (Hopper and Muir, 1984). Of the 43 species of mammal known to inhabit the area at the time of European settlement, 17 no longer exist there (Friend, 1987). Others are very restricted in their distributions, including the red-tailed wambenger (*Phascogale calura*), the numbat (*Myrmecobius fasciatus*) (Friend, 1987; Wallace and Moore, 1987) and the Tammar wallaby (*Macropus eugennii*) (Christensen and Maisey, 1987).

Many of the plants and animals that still survive are under threat due to the ongoing degradation of many fragments. As animal populations are reduced in size there is a risk of:

- a loss of genetic diversity
- competition for resources with introduced herbivores
- predation by introduced predators such as foxes and cats
- the possibility that single disturbance events such as fire will wipe out a surviving population.

Plants are under pressure where:

- the microclimate within a fragment has changed to an extent where individual species are put at a competitive disadvantage
- they are no longer exposed to the fire regimes that trigger seed germination or provide a vacant niche for establishment
- there is competition from weeds
- grazing occurs from introduced predators
- there is a lack of pollinators/seed dispersers.

A study in Kellerberrin Shire of remnants intensively grazed by sheep has found that plant species diversity can decrease by over 85%. This decline is accompanied by an associated decline in the diversity of fauna. It also found that weed cover may be up to 90% in grazed remnants compared to 2% in those which are relatively undisturbed (Abensperg-Traun, 1995). Many Australian native plants are adapted to relatively low levels of nutrients in the soil. Nutrients in the soils of the wheatbelt are low, especially phosphorous (Main, 1987). Addition of nutrients to the soil as fertilisers, such as superphosphate or from the manure of grazing stock, may inhibit growth. According to Specht (1981) some Australian plants show signs of toxicity when exposed to phosphorous at levels higher than those which occur naturally in their native soil.

3.2 The history of settlement and vegetation clearing

Clearing of land for cropping and grazing first began in the south-west of Western Australia at the time of initial settlement in 1829. However, population growth and thus agricultural development was slow. By 1900, only 30,000 ha of land was under wheat production. The greatest periods of clearing were in the period following World War I, before the 1939 depression and following World War II (Burvill, 1956a). By 1985, the area sown to wheat exceeded 4.6 million ha (Schofield *et al*, 1988). The federal government encouraged clearing for agriculture by providing various incentives for land clearing. As farmland expanded, primary production increased and with it the personal wealth of many farmers and the nation as a whole, as produce was sold and exported overseas.

Early clearing policy was not based on a thorough assessment of the ecological or hydrological impacts of deforestation or of the long term economic sustainability of the regions concerned. This concept had not been explored to the extent that it has today and the effects of deforestation on soil stability and regional hydrology were not known. Australia's early agricultural research focused on higher production with little attention given to the effects of this on the land (Roberts, 1992). This has resulted in a number of major land degradation and ecological problems in many of the agricultural regions of the State. These include wind and water erosion, increasing soil acidity and soil salinisation.

3.3 Government policy on land development and clearing

Conditional Land Development Grants were introduced following legislation initiated by John Forrest in 1887, as a member of the Legislative Council. These were designed to encourage farmers to produce food for the growing population of Western Australia (McArthur, 1991). Prior to this, much of the area that is now the wheatbelt had been under pastoral leases. The Development Grants allowed a 'head of a household or a male person over 18 years of age' to obtain a farm on 160 acres (65 ha) under the condition that within 7 years it was completely fenced and at least one quarter was cleared and under crop. Areas of land to 1000 ha could be purchased cheaply under similar agreements (Battye, 1913) known as 'conditional purchase' agreements.

The conditional purchase agreement system continued under the much the same arrangements outlined in the 1887 legislation until the early 1980s, requiring a minimal rate of land development. The block size was increased over the years to a normal maximum of 2000 ha, to allow farmers in the drier areas to have enough land to form a viable economic production unit (Jarvis, 1986).

By the early 1980s, it became obvious to people from a number of disciplines that the rate of land release and clearing was reaching a stage which required close examination. By this time all reasonable agricultural land had been released and it was asserted that much of the land being released was not viable for farming and was being issued without adequate assessment of

economic viability or environmental effects. For instance, according to Newby (1983), the release of 31,000 ha of land at Mount Beaumont in 1982 was done without adequate assessment. He asserted that the rainfall pattern there was unknown, some 'large areas of sand which should never have been cleared' were released, the hydrology was not studied and the flora and fauna of the region were 'not studied at all'. At the time, he felt that there was an urgent need to upgrade the procedure of assessing large areas considered to be suitable for clearing and development. After due consideration of the issues, policy changes were made. From the mid 80s onwards, very little land was released.

Widespread concern over the effects of continued clearing on private land prompted the introduction of gazetted land clearing regulations in January 1986 under the *Soil and Land Conservation Act.* These regulations enable the state government to intervene and prevent clearing of land if is likely to cause land degradation. Under the Act, the land owner or occupier, must notify the Commissioner of Soil Conservation of intent to clear more than one hectare of land at least 90 days before the date of commencement. The Commissioner then assesses the likelihood of land degradation resulting from the clearing. Assessment considers both the local and off-site effects. If it is considered that clearing will have a detrimental effect on soil or hydrological stability, the land then becomes protected under the *Soil and Land Conservation Act* by the issuing of a Soil Conservation Notice, or by the entering into an Agreement to Reserve by the landholder. The Agreement is a formal document which states that the landholder agrees with the Commissioner's assessment of the value of retaining vegetation on the land and of the need for sound management practices, particularly stock exclusion. The Agreement is registered as a memorial on the Certificate of Title. The time period of the Agreement is indefinite and can only be discharged or modified by application to the Commissioner

The *Soil and Land Conservation Act* was amended in December, 1990 to encourage land owners to protect remnant vegetation by the use of Conservation Covenants. These allow farmers who voluntarily wish to protect remnant vegetation in recognition of the its value for land and nature conservation reasons to place conservation covenants on them. A time period is specified, and the covenant is then irrevocable over the time period specified. The covenant is registered as a memorial on the Certificate of Title. Under the Remnant Vegetation Protection Scheme (RVPS), the time period is 30 years. The RVPS was established in 1989 by the Western Australian government to provide an incentive to landholders to protect and conserve native flora and fauna on their land. The scheme provides grants of a proportion of the cost of fencing remnants to protect them from stock grazing. The landholder must agree to manage the remnant in a way that will not impair the conservation value of the remnant. For instance, grazing of livestock is not permitted, nor is the removal of vegetation, soil, stones, sand, gravel or rock (Soil and Land Conservation Council, 1992b).

In May 1995, the Regulations of the *Soil and Land Conservation Act* were modified so that nature conservation significance and values were to be taken into account in addition to the effects on soil and hydrological stability. The regulations specified that clearing was to be discouraged on properties where it would reduce the remnant vegetation or equivalent deep rooted vegetation to less than twenty per cent of the total property area. It also stated that clearing would be discouraged where the total area of remnant vegetation in a shire was less than 20%. The shires of Pingelly, Tammin, Kellerberrin and Dumbleyung are in this category (see Section 2.4). These restrictions as they apply in different situations are summarised in Figure 7. Areas with native vegetation above 20%, such as Lake Grace, are subject to normal land degradation guidelines.

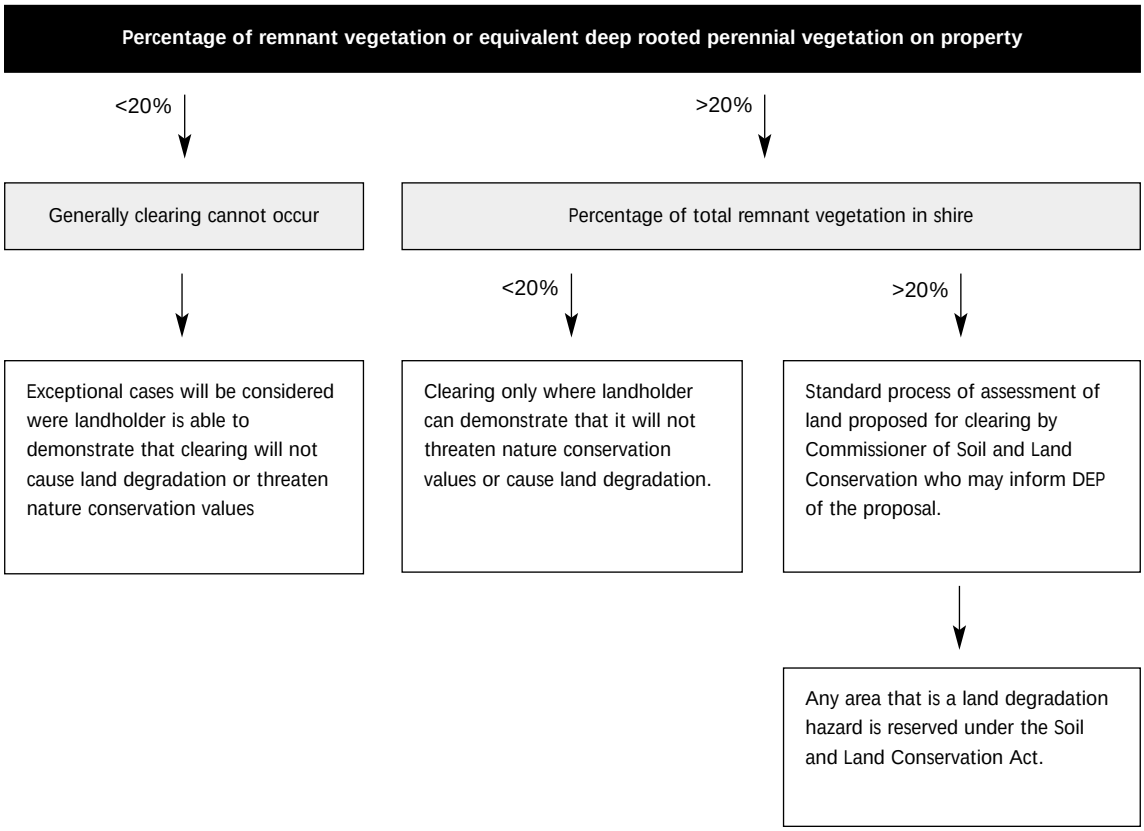
3.4 Land degradation – erosion and salinisation

The most obvious sign of land degradation in the early stages of clearing was extensive water erosion. Soil had been held together by the interlaced root network of the native plants which were adapted to the specific conditions of the area. Once removed the soil was readily washed away, the erosive potential of the water over and within the soil gouging out deep channels.

In the 1950s, wind erosion of land and 'soil drift' were recognised as a problem associated with overclearing that needed to be addressed. According to the Commissioner of Soil Conservation there were many cases where soils had 'drifted onto roads and fences and rendered them useless'. A photograph of the time shows an area where two feet (60 cm) of topsoil had been removed by wind erosion. Stumps of bush which had been cleared to ground level, were clearly visible, protruding well above the ground surface (Burvill, 1956a).

As early as 1924, the association between the clearing of native vegetation and the salinisation of water courses had been made by Wood (1924). By the early 1930s, it had been recognised as a serious problem to agriculture in the 11–25 inch (270–630 mm) rainfall belt (Smith, 1962). In 1956, a published survey of farmers on 27 million acres farmland in the 14–25 inch rainfall found that at that time, 25% of the participants had salt encroachment on their land which they attributed to 'land development' (Burvill, 1956b). In 1955, it was estimated that in Western Australia, 73,436 ha of previously arable land (0.5% of the total cleared land) had become too saline for conventional crop and pasture species. By 1989, this had expanded to an estimated 443,441 ha, 2.3% of the 15.7 million ha of cleared land (George, 1990). In that year, it was estimated by Saunders and Hobbs (1989) that land salinisation was expanding at as much as 625 km^2 per year and that there was potential for 2.5 million ha to be affected in the absence of remedial measures. Hobbs (1992) concluded that the agricultural

Figure 7: A summary of the restrictions on clearing that were introduced May 1995.



practices of the wheatbelt farms were not sustainable in the long-term.

The Soil and Land Conservation Council (1992a) estimated the amount of cleared land affected by salinity in 1992 to be 3–4.5% in Kellerberrin, Dumbleyung and Lake Grace, 4.5–6% in Pingelly and 6% in Tammin.

3.5 Soil salinisation and the role of native vegetation in prevention and remediation

Salt within the soil is mainly the accumulation over millennia of salt contained in rainfall, the original source of which is the sea. Salt stored in the soil and groundwater is mobilised by extra soil water as a consequence of land clearing. Removal of deep rooted native vegetation and replacement with shallow rooted crop and pasture species decreases the amount of evapotranspiration from the soils. Crop and pasture species may have a root system to about 2 m, a sandplain heath species more than 10 m (Lefroy and Scott, 1994) and a native tree up to 40 m (George *et al*, 1996). The additional water raises watertables or increases the pressure in confined aquifers creating an upward leakage to watertable aquifers. When the watertable becomes close to the soil surface, water evaporates leaving the salt behind; progressive soil salinisation results. Salt may flow in water laterally or vertically toward water courses and increase their salinity as well (Ghassemi *et al*, 1995).

Methods of rehabilitating salt-affected lands include a mixture of tree and shrub planting, the planting of crops with a relatively high evapotranspiration rate and deep root systems and the control of surface water flow using drains (Schofield *et al*, 1989). Planting areas of trees and shrubs, particularly in recharge areas of a catchment, will increase the evapotranspiration rate and reduce the level of the groundwater with a subsequent decrease in soil salinity. Juvenile eucalypts of two to three years of age transpire 11–27 litres of water per tree per day, depending on the season, landscape, position and local climate (Greenwood and Beresford, 1979). Planted at densities of just 80 stems per hectare swamp yate *(Eucalyptus occidentalis*), a native of saline swamps, has been demonstrated to lower the watertable sufficiently to return nearby salt affected land to productive use within six years (Engel, 1988). Watertable reductions of between one and four metres have been recorded in various studies following planting on or adjacent to saline groundwater discharge areas (eg. Sonagan and Patto, 1985; Hookey *et al*, 1987; Engel and Negus, 1988; Schofield *et al*, 1989).

Planted vegetation also decreases wind and water erosion where this is problematic. If appropriate trees are chosen they can provide fodder for sheep and cattle. In many instances, the planting of local native species is most successful as they are suited to the local soil and climatic factors. This assists in the preservation of species of plants endemic to the region and provides habitat for insects, birds, mammals and other organisms. Where trees are planted between or to connect other areas of planting or remnants of bush, they may provide corridors for wildlife movement.

3.6 Values of remnant and replanted vegetation

Vegetation in the form of remnants or areas of replanting have a number of values for a farm. Some of these values are readily economically quantifiable, others are not. For this reason, these values are often overlooked by some farmers who have traditionally regarded their farm solely as land from which to gain an income and so have a short-term focus on realisable income.

Shelterbelts can increase crop yields significantly to a distance of approximately 10 times the height of the vegetation. Animal production can also be increased as a result of the sheltering effects of remnant vegetation as it decreases the exposure of stock to wind and rain, and in the summer provides them with shade (Hobbs and Wallace, 1991). Aside from the economic benefits that can be derived from bushland as it affects stock and

crop production, there are also economic benefits to be gained from the bush itself. Remnant or replanted bush can be managed for the sustainable yield of fenceposts, firewood, honey and cut flowers, as well as used as a source of seed for sale to nurseries, or for the growing of trees for sale or revegetation of the farm.

Values which are not as easily measured in terms of economics are shade and shelter from wind, noise and dust that areas of bush provide to adjacent farm buildings and dwellings. Native vegetation also provides habitat for the native animals which most farm residents take pleasure in observing. Some animals, such as those which predate insects, perform a role in regulating populations of potential pests. Furthermore, it provides an area of recreation, a place to take visitors, have picnics, and particularly where there are resident children, an area for play and learning (Hussey and Wallace, 1993).

3.7 Sustainable production

Increased awareness within the scientific community and the more farsighted members of the agricultural community of the effects of agricultural practices on the soil and on the biota have brought about the desire to work toward achieving primary production which is sustainable in the long term. According to the Australian Environment Council's Land and Water Care Policy Declaration No.1 (cited in Soil and Land Conservation Council, 1992), such a goal requires that '...all decisions affecting land and water should have the objective of ensuring the sustainable use of renewable resources, and the maintenance of natural environments, to meet the needs of the present, without compromising future generations' ability to meet their needs.'

3.8 Landcare

Landcare is a community based action program which has become the main focus for all components of land management including soils, water, vegetation and fauna (Soil and Land Conservation Council, 1995). In 1982, in response to the increasingly evident land degradation, the Western Australian Department of Agriculture launched a program to involve the farming and agricultural community. In 1982, Amendments to the *Soil and Land Conservation Act* provided a mechanism for land owners to request the Minister for Primary Industry to initiate the establishment of Soil Conservation Districts and associated committees. This precipitated the formation of Land Conservation Districts and associated committees of land holders, representatives of local government, industry organisations, state natural resource management agencies and other community members (Wilson, 1995). In June 1995, there were 145 gazetted Land Conservation Districts, with a total designated membership of 2,265. There are around 300 sub-catchment groups. These Land Conservation Districts now cover 90% of the agricultural and pastoral region (Soil and Land Conservation Council, 1995).

4. Survey contents and method

4.1 Survey content

A survey booklet was developed, based largely on the content of the form used in a 1986 survey conducted by Ms Anne Coates. This survey was reported in 'Management of Native Vegetation on Farmland in the Wheatbelt of Western Australia' (Coates, 1987). The survey comprised 53 questions, some with sub-questions, grouped into 4 sections. A copy of the survey form is contained in Appendix C.

As in the 1986 study, the shires of Pingelly, Tammin, Dumbleyung and Lake Grace were surveyed. Kellerberrin was included in 1996 at the request of CSIRO who have been involved in conservation work and research there.

4.2 Sample size and selection

It was decided to replicate as closely as possible the sample size used in the 1986 survey (Coates, 1986). In each of the shires, this consisted of approximately one eighth of the total number of farming properties. In Lake Grace, the largest shire, the sample size was reduced from the original 74 in 1986, to 52 in 1996 because of time and budget constraints. The sample size for each of the shires was:

Pingelly	24
Lake Grace	52
Dumbleyung	31
Tammin	14
Kellerberrin	22
Total	*143*

Each participant was randomly selected from Agriculture Western Australia's AGPACS database which contains property and property owner information.

4.3 Survey method

All selected farmers were notified by mail of inclusion in the study (see letter Appendix B) then around two weeks later contacted by telephone to arrange an interview appointment at their place of residence. At the time of the visit, each person was given the questionnaire to read and fill out as the questions were asked and explained where necessary by the interviewer. A single interviewer was responsible for all visits ensuring a consistency of method and of response to the queries for each question. The interviewer ensured all questions were filled out in the required manner and that the farmer had correctly interpreted the question.

The last section, Section D, asked for the farmers comments on any issue related to native vegetation on farms. A number of farmers verbally expressed particular concerns but were reluctant to write these down in many cases from a concern that their written expression skills were inadequate to convey their point effectively. Where this was the case the interviewer offered to paraphrase what had been said and to write it down. In all instances this option was accepted and the interviewer constructed a statement to express the farmers view, checking it with him or her verbally before and after recording it.

An average of four farms per day were visited. Each interview generally took between three quarters and one and a half hours to complete. Occasionally, an interview took as little as 30 minutes and the longest interview took two and a half hours. The longer interviews were generally the result of either family debate on the answers to the questions or to the farmers or other family members imparting information on the issues raised by the survey. In this way, much valuable information was obtained which added to the interviewer's understanding of the way in which the questions had been interpreted by the respondents and on many issues not directly covered by the survey questions. As much of this information as possible has been included in this report.

4.4 Data treatment

The information from each survey booklet was transferred to an Oracle database and accessed via the program SITES. The SITES program or Soil Information Transfer and Evaluation System was developed by the Australian Collaborative Land Evaluation Program in association with Agriculture Western Australia and the Queensland Department of Primary Industries. Using SITES, data was manipulated to extract either sums of responses to particular questions or subsets of totals which correlated to selected responses from other questions.

4.5 Presentation of results

To present the findings of the survey in the most easily interpreted form, the results of each question are presented and discussed together.

5. Demographics

5.1 Farm type

Of the farms included in the study most, eighty five per cent, fell into the category of 'cropping/sheep'. The main crop was wheat. A few farms carried pigs as well as sheep and wheat (3%) or cattle (9%), or both pigs and cattle (1%). Graph 1 presents the percentage of farms of each production type included in the survey.

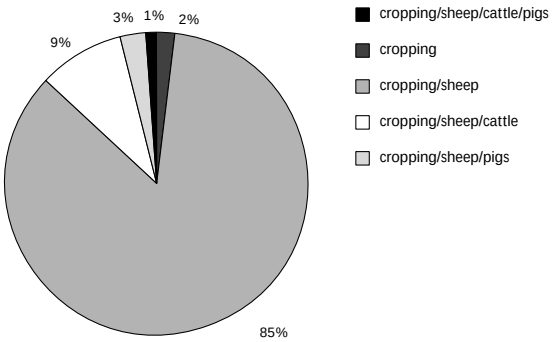
5.2 Farm size

The mean size of surveyed farms in each shire was calculated and is presented with the mean farm size in the 1986 survey (Coates, 1987) for comparison, in Table 3. In general, the size of farms had increased since 1986.

5.3 Gender of participants

Woman farmers accounted for 10% of individuals who filled in the survey. In all cases, they managed and worked the farm with a male partner who was not in attendance at the time of the survey. In all instances where a couple were both present, the male partner answered the survey with input from the female partner.

Graph 1: The percentage of farms of each production type included in the survey



5.4 Age of farmers

Farmers indicated their age by selecting one of a list of age group categories. The results are shown in Graph 2 together with the age distribution of the sample group surveyed in 1986 (Coates, 1987).

The method of selection of the farmers in each of the shires may have resulted in a bias toward older farmers. Selection was made from the AGPACS database of Agriculture Western Australia. This was developed in 1993 using input from regional Agriculture Western Australia offices to provide easily accessible property and owner/manager information. The property information in the database proved to be outdated in a number of instances suggesting that the information provided to set up the database was not adequately researched in all instances. Some farms had changed hands a number of years ago and the previous owner was listed. In most instances, where this was the case the letter of contact regarding the survey was returned. In some cases, however, the discrepancy was discovered when phone contact was made.

It is possible that because of these problems there may have been some bias toward the older age groups and therefore the data obtained by the survey may not be an accurate reflection of the age structure of the farmers in the shires. This would have been offset to some degree by the inclusion of farmers who had taken over the

Table 3: The mean size of farms surveyed in 1986 and 1996

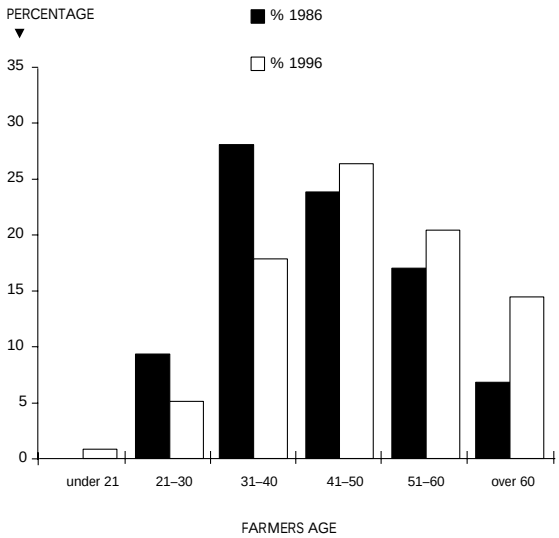
Shire	Mean farm size 1986 (ha)	Mean farm size 1996 (ha)
Pingelly	1,183	1,491
Lake Grace	2,669	2,958
Dumbleyung	1,913	1,783
Kellerberrin	Not surveyed	2,051
Tammin	1,716	2,079

land, where they were contactable on the phone number that had belonged also to the previous owner. Furthermore, some of the older farmers who had partially or completely retired asked me to pass on my enquires to their sons who had taken over. In other instances, the senior farmers within a family requested their sons to fill in the survey if they were in attendance at the time of the visit.

5.5 Level of formal education

Most farmers were formally educated to the level of secondary school years 8, 9 or 10. A significant proportion, 18% had attended agricultural college. A summary of education level of participant farmers is presented in Table 4 with the 1986 survey data. A few farmers expressed dissatisfaction at the inclusion of the question on education within the survey as they considered it irrelevant to the focus of the survey.

Graph 2: The percentage of farmers in each of the age categories listed in the survey for 1986 and 1996



5.6 Organisation affiliation or membership

Most farmers belonged to one or more organisations from which they obtained information on farming operations and land conservation. The Western Australian Farmers' Federation had the greatest membership, with 68% of the surveyed farmers indicating affiliation. Of farmers, 64% said that they were part of a catchment group. Table 5 below lists all the organisations, providing landcare information, which farmers in the survey were affiliated.

5.7 Income from property

Survey participants were asked to estimate the percentage of their total income which came from their property. Of respondents, 91% stated that 90% or more came from the farm itself. Income that was not directly earned from the farm came from shares or other investments, their partner's employment or their own employment off the farm.

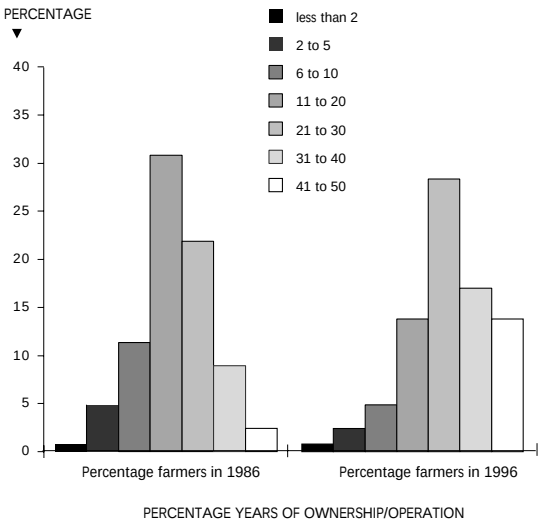
5.8 Length of property ownership

Farmers were requested to indicate the length of time they had operated or owned their property and whether the farm had been operated by their family before them. Graph 3 and 4 presents the results. Farms that had been in the family for more than one generation made up 70% of the total. In most instances, the farm had been transmitted through the male line from father to son. In two instances, the farm had been transferred to a daughter and in both cases was worked predominantly by the daughter's male partner.

Table 4: Highest level of formal education of farmers in 1986 (Coates, 1987) and in the 1996 survey

Highest level of formal education	1986 (%)	1996 (%)
Primary school	13	5
Secondary years 8,9,10	54	45.5
Secondary years 11, 12	12	17.5
Technical college	5	4.2
Agricultural college	14	18
University	2	1.5

Graph 3: Number of years of operation or ownership of farms surveyed in 1986 and 1996



Graph 4: The number of generations which have operated the surveyed farms expressed as a percentage of the total number of farms surveyed

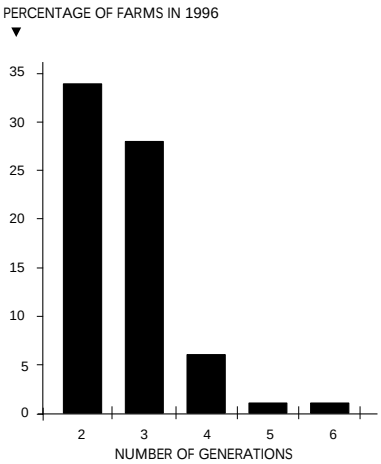


Table 5: The percentage of farmers in each of the shires, and of the total number of participants, who indicated that they were members of or affiliated with the listed organisations.

Organisation/Group	Percentage of total no. of farmers	Percentage farmers surveyed in each shire				
		Pingelly	Lake Grace	Dumbleyung	Kellerberrin	Tammin
Land Conservation Group	48	33	65	42	32	50
Catchment Group	64	21	41	58	45	79
Western Australia Farmers Federation	68	58	58	74	64	71
Greening Australia/Men of Trees	5	4	6	10	0	0
Nature Conservation Group	1.5	0	0	2	0	0
Kondinin Group	33	25	35	35	41	21
Pastoralists & Graziers Assoc.	3	0	0	2	0	21
WISALTS	1.5	4	0	0	0	7
Western Australia No-till Assoc.	1	0	2	0	0	0

6. Farming experience and farm plans

6.1 Farming experience

The participants were asked how long they had been involved in farming and how long they had been responsible for major farm management decisions. This information is summarised in Table 6. Almost all farmers in the survey had many years farming experience; 98% had more than 5 years. Similarly, the majority of farmers (93%) had been involved in farm management decision making for more than 5 years.

6.2 Farm plans

Farmers were asked whether they had a farm plan for the long-term management of their property. It was specified that this farm plan should include a farm map and a list of the actions that he or she planned to undertake in the next few years. Overall, 60% indicated they had a farm plan. Graph 5 below shows the percentage of farmers with farm plans in each of the shires.

Where farmers had a farm plan they were asked where they got the information to develop the plan. The responses are summarised in Table 7. In all shires, this information came mainly from Agriculture Western Australia, catchment groups and landcare Project Officers. Of note is the disparity between the proportion of people gaining information from Agriculture Western Australia in the shires of Tammin (22%), Kellerberrin (91%), and the remaining shires where information was sought from this source by 42–55%.

Graph 5: The percentage of farmers in each shire who stated that they had a farm plan

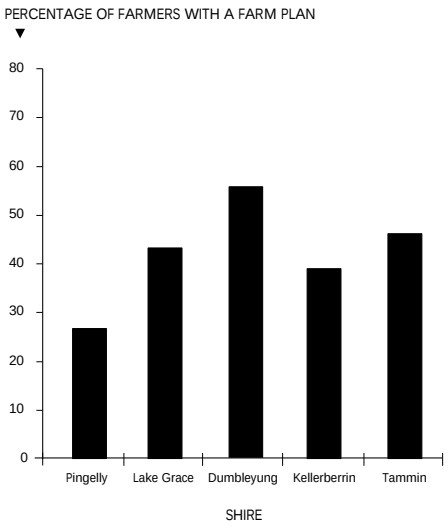


Table 6: The number of years of farming and farm management experience

Years	Percentage of farmers	
	Farming experience	Farm management experience
0–5	2	7
6–10	5	8
11–15	5	10
16–20	9	16
21–25	15	14
26–30	16	18
31–35	10	10
36–40	17	8
41–45	13	6
46–50	4	2
Over 50	4	1

Farmers were requested to indicate whether they had undertaken a list of land conservation activities that could be part of their planned farm operations, regardless of whether they had a farm plan. All farmers answered this question. The activities and the farmer's responses are presented in Table 8. For all the listed activities except alley farming, the majority of respondents had started the activity or considered it ongoing.

Eighty-two per cent of participants had replanted vegetation, most of the remainder were intending to in the future. There were a few people who were not; they considered that they already had enough trees on their property. Many farmers (78%) had either commenced or completed the fencing of their bushland from stock. Alley farming was not considered to be applicable for most farms (81%).

Table 7: Agency which assisted farmers with the development of their farm plans or from which they sought advice and the percentage of farmers with a farm plan in each shire who sought advice from the agency. (The totals for each shire do not equal 100% as some of the farmers sought advice from more than one agency).

Agency which assisted with farm plan	Percentage of farmers who received information from the agency				
	Pingelly	Lake Grace	Dumbleyung	Kellerberrin	Tammin
Agriculture WA	55	42	42	91	22
Catchment Coordinator	44	19	42	41	44
National Landcare Project Officer	11	35	21	33	11
CSIRO	0	0	4	1	0
Computer programme	0	3	0	0	0

Table 8: The percentage of farmers who had completed, started or planned the listed land conservation activities, or who said that an activity was not applicable to their farm.

Land conservation activity	Percentage of farmers			
	Completed	Started/Ongoing	Planned	Not applicable
Replanting	1	81	14.5	3.5
Fencing bushland/replanting	6	72	16	6
Contour banks/drains	25	58	9	8
Soil treatments eg. lime/gypsum	1.5	52	24.5	22
Cultivating along contours	11	66	12	21
Minimum till/no till	5	72.5	5.5	17
Alley farming	1	5	13	81

7. Native vegetation, replanting and land degradation

7.1 Land degradation

Various types of land degradation are prevalent in the shires surveyed. Survey participants were requested to estimate the area of land on their property that was affected by particular types of land degradation. To elicit a consistency of response, each of the types of land degradation was defined. They were:

- **Salt** Land which is bare of vegetation as a result of salinity or grows only salt tolerant vegetation, or is salt lake country
- **Wind erosion** Land which tends to be bare as a result of wind action
- **Water erosion** Land which is bare and gullied from water movement
- **Soil acidity** Land with an acidity of 4.5 or below
- **Waterlogging** Land where water sits on the ground for a few days or more during an average winter.

Table 9 contains the percentage area of land in each of the shires that is affected by the various types of land degradation, based on the areas estimated by each of the participants in the survey. The estimated salt affected area of farmland in 1986 was calculated by Coates (1987). This data, together with the 1996 results, are in Graph 6. No direct comparison between the two years can be made, however, as the farms in each survey were not the same.

The percentage of the total area of the farms in each shire that are affected by the land degradation categories listed above is presented in Graph 7. The least affected shire is Lake Grace, with 8.9% of land and the most affected shire is Tammin with 38% of land. It should be noted that salt lake country is included in the land listed as degraded.

Graph 6: The area of salt as a percentage of the total farm area for each shire recorded in 1986 and 1996 (the same farms were not surveyed on both occasions and are therefore not directly comparable)

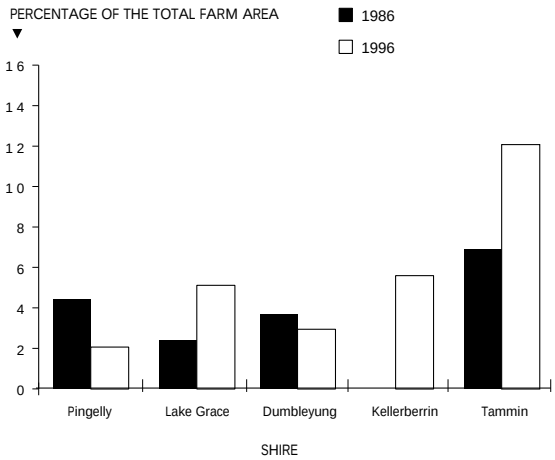
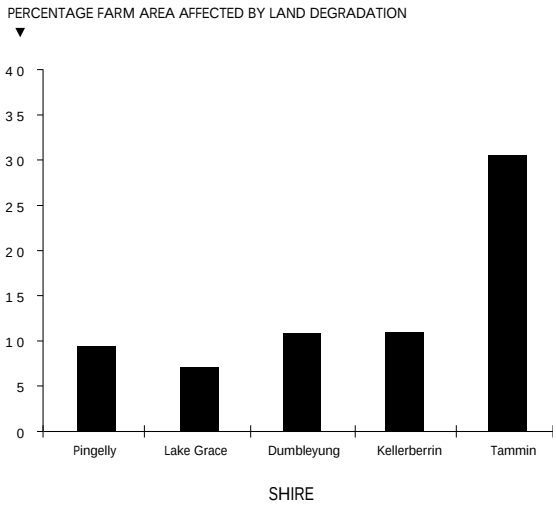


Table 9: The percentage of the total surveyed property area affected by particular types of land degradation in each of the shires.

Land degradation problem	Percentage of total surveyed property area affected by types of land degradation				
	Pingelly	Lake Grace	Dumbleyung	Kellerberrin	Tammin
Salt	2.6	6.4	3.7	7.0	15.1
Wind erosion	0.5	2.0	1.0	0.1	2.5
Water erosion	0.1	0.1	0.2	0.1	1.8
Soil acidity	3.4	0.2	5.3	5.5	15.9
Non-wetting soil	0.6	0.4	1.0	0.1	1.8
Waterlogging	4.7	1.6	2.5	1.0	3.0

Graph 7: The percentage area of farm affected by land degradation (salinity, water erosion, wind erosion, soil acidity, non-wetting soil, waterlogging)



7.2 Native vegetation

Farmers were requested to estimate the area of remnant vegetation on their land, the percentage of this that was fenced and the percentage growing on arable land. This information is summarised in Table 10 together with the total area of the shires covered by native vegetation and the Coates (1987) data for comparison.

7.3 Use of bush

A list of possible uses of bush were given. The participants were asked to mark any which applied to their situation and to write in any other uses that were not listed. The results are presented in Table 11 together with 1986 results from Coates (1987). The predominant use was the grazing of stock; in 41% of cases this was listed as regular grazing, compared with 71% in 1986. Farmers generally wished to emphasise that the reason that sheep grazed the bush was because there were no fences to exclude them rather than a desire on their part to utilise it in this way. The reduction in the percentage of farmers grazing bush since 1986 is probably the result of the increased area of fenced bushland over the last ten years (see Table 10). Some farmers who have fenced their bush now use it only for emergency grazing, explaining the increase in this use in 1996 compared to 1986. A further percentage indicated that they used the bush for stock shelter. The percentage of farmers using their bush for the dumping of rubbish had decreased by over half, from 38% in 1986 to 17% in 1996. A number of farmers said that they had previously used their bush for rubbish disposal but now took it to the local tip as they realised that they were devaluing its conservation status. Where farmers still dumped rubbish in the bush it was usually into an excavated hole.

Recreational use of bush by the farmers and their families occurs on 31% of farms. Where this was the case, it was used for walks, barbecues and for children's play. Only one farmer listed ecotourism as a use of their bush. This person had a 'farmstay' on their property and took visitors to the bush to show them the vegetation and wildlife. Another five people stated that they were interested in providing tourist accommodation on their properties and that their bush would be a potential attraction for visitors.

Table 10: The percentage area of native vegetation in each shire: expressed as a percentage of the area of the surveyed farms; fenced from stock; and considered by farmers to be growing on arable land

	Total shire area native vegetation (%)		Total surveyed farm area native vegetation (%)		Area of farm native vegetation fenced (%)		Area of native vegetation on arable land (%)	
Shire	1986	1996	1986	1996	1986	1996	1986	1996
Pingelly	13.8	9.5	10.4	7.7	11	37	28	30.6
Lake Grace	30.6	59.15	13.6	12.3	12	44.7	51	93.6
Dumbleyung	10.4	12.7	6.3	10.2	24	70	31	43
Kellerberrin	–	8.08	–	7.7	–	39.4	–	35
Tammin	7.0	3.22	6.6	6.2	24	21	45	19

7.4 Clearing of native vegetation 1987–1996

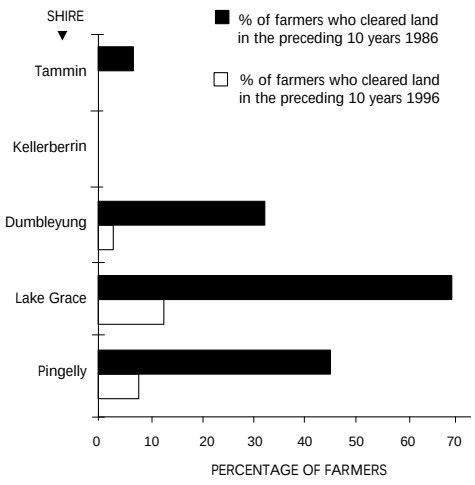
Participants were requested to estimate the amount of land that had been cleared in the last 10 years. They were also asked to indicate whether they were planning to clear in the next 10 years. A summary of the answers to these questions is presented in Graph 8, 8a and Table 12. The percentage of farmers who said that they had plans to clear in the next 10 years decreased in 1996 in all shires except Dumbleyung.

Significantly, less land had been cleared in the last decade compared to the one before. Where land has been cleared it has been used for cropping and pasture and all cited this as the main reason for clearing. Only 10 (7%) of the surveyed farmers had cleared in the last 10 years and of these, only one would have cleared more at the time if more money had been available and four cleared because of economic pressures. Three of the farmers said that a secondary reason for the clearing was a fear of stricter clearing regulations in the future.

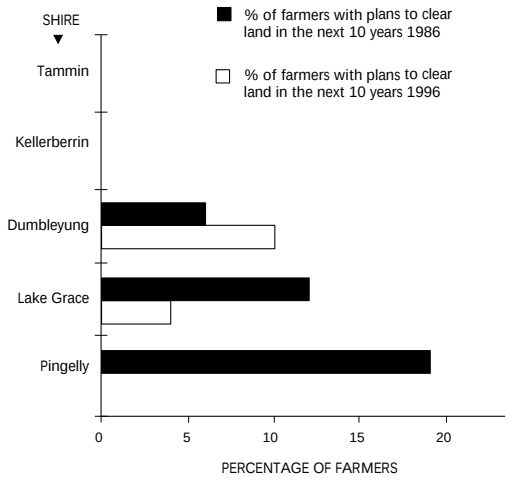
Table 11: The uses of farm bush specified by farmers in 1996 and 1986 (1986 from Coates, 1987)

Uses of native vegetation	Percentage of farmers who specified use 1986	1996
Regular grazing	71	41
Emergency grazing	3	17
Firewood	15	15
Fence posts	12	7
Gravel	27	11
Honey	6	3
Rubbish disposal	38	17
Commercial source seeds/flowers	–	4
Personal recreation	not asked	31
Ecotourism	not asked	1
Stock shelter	not asked	10

Graph 8: The percentage of the total number of farmers who said that they had cleared land in the last 10 years



Graph 8a: The percentage of the total number of farmers who intended to clear land in the next 10 years



7.5 Plans to clear in next ten years

Only five farmers (3.5%) stated that they were going to clear land in the next 10 years, another seven (5%) said that they would possibly clear land. All cited their main reason for intending to clear as a need to increase the area of productive land. Three farmers said that they were afraid of stricter government controls in the future and this was a factor in their planning. Not all people who said they planned to clear land had permission to do so. Table 13 shows the percentage of farmers who indicated that they were intending to clear or would possibly clear.

7.6 Replanting

In 1986, only 62% of surveyed farmers had replanted areas of the farm with trees or shrubs. In this survey, 84% of farmers had replanted some vegetation. Of these, 80% sought advice on replanting. Graph 9 below shows the percentage of farmers in each shire had done some replanting and the percentage of these who sought advice on replanting.

Where people had replanted they were asked to note the area of replanting that had been done for different reasons. Graph 10 presents the total area replanted as a percentage of the total farm areas in each of the shires surveyed and Graph 10a shows the mean area replanted for farms in each shire. The greatest mean percentage farm area replanted, 32.1%, was in the shire of Tammin. Graph 11 shows the total number of ha that were planted for various reasons. The total

Graph 9: The percentage of farmers from each shire who have replanted and the percentage of these who sought advice on replanting

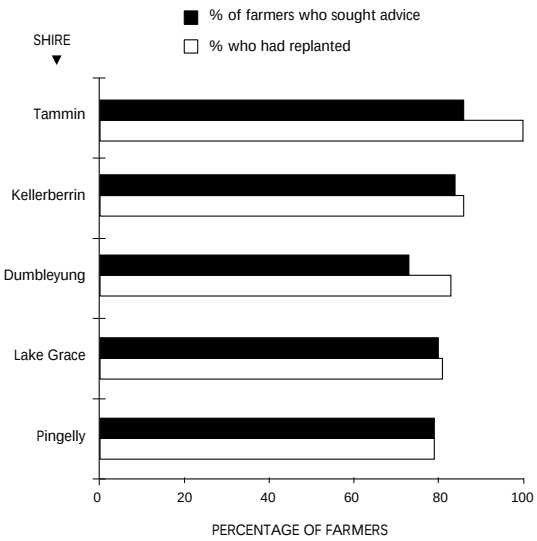


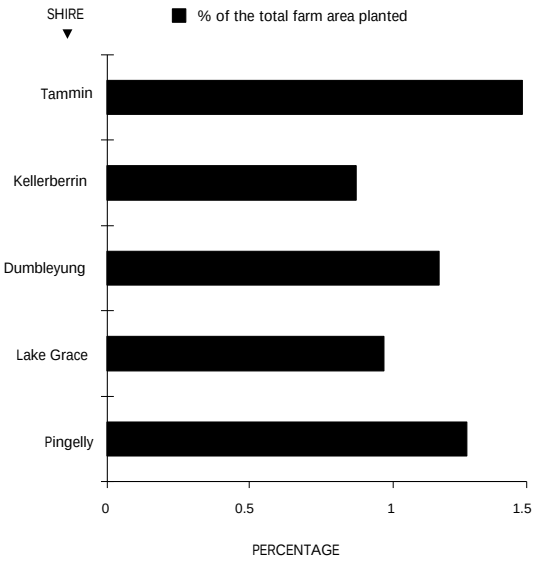
Table 12: The number of hectares cleared between 1987–1996 and those cleared between 1977–1987 (from Coates, 1987) on the surveyed farms in each shire. (The farms surveyed were not the same.)

Shire	Number of hectares cleared 1977–1986	1987–1996
Pingelly	684	120
Lake Grace	37,558	1,561
Dumbleyung	3,783	56
Kellerberrin	–	0
Tammin	5	0

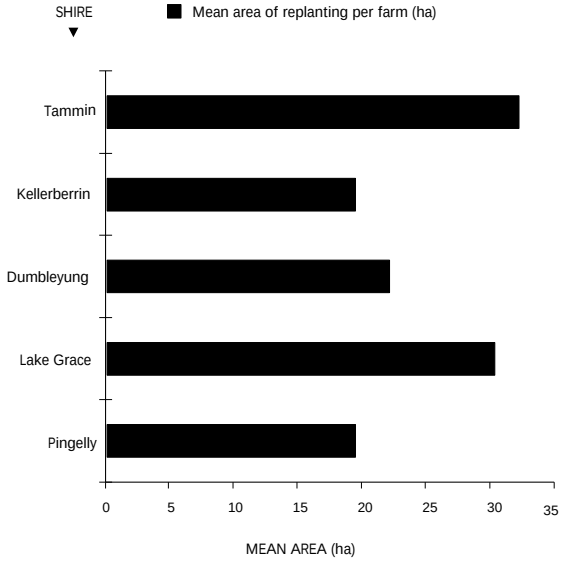
Table 13: The percentage of farmers in each shire who indicated that they were planning to clear bush in the next 10 years and the total number of hectares that would be cleared.

Shire	Percentage of farmers Yes	Possibly	Total no. of ha to be cleared
Pingelly	0	4	10
Lake Grace	4	6	462
Dumbleyung	9.5	9.5	715
Kellerberrin	0	0	0
Tammin	0	0	0

Graph 10: The percentage area of the total farm area replanted in each shire



Graph 10a: The mean area of replanting per farm in each shire (ha)



number of hectares replanted in all shires was 3,591 ha. Revegetation to combat land degradation was the main reason given, accounting for two thirds of all planting. The second most important reason was for shelterbelts and windbreaks and the third reason was to provide stock fodder. When survey participants filled out this question, many stated that the reasons for replanting overlapped. For instance, they may have planted saltbush on salt affected land to combat land degradation but they also planted it with its value as stock fodder in mind.

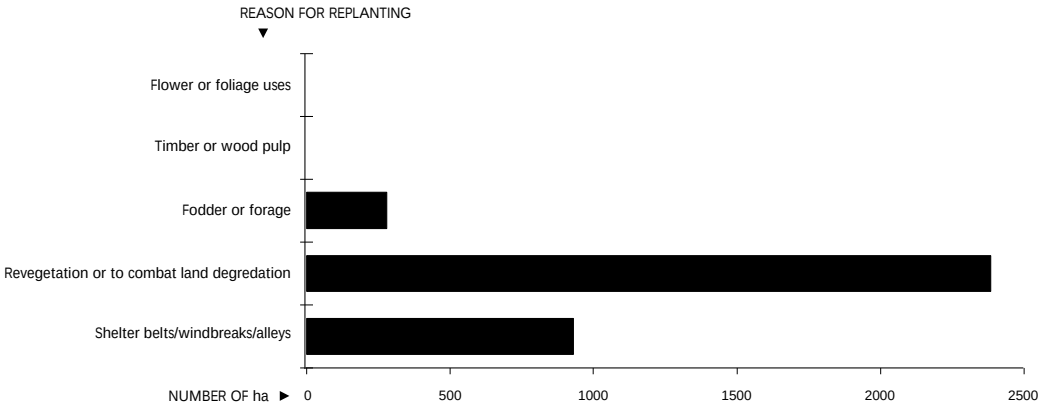
Where farmers had replanted, they were asked to indicate the type of species they had planted. They were requested to indicate whether the species planted came from the local area and if so, if the seed was collected locally, if the plants were native to Australia but not locally, or if they were non-native species. A similar question was asked by Coates (1987) in 1986. The results of this survey are presented in Graph 12 with the results from 1986 for comparison. Graph 13 presents the same results from the 1996 survey but groups the species types planted by shire.

The number of people planting non-native species had more than halved in the last 10 years. Pine trees were the main non-native tree planted by farmers interviewed in this survey. They were chosen for their successful growth on deep sands. A few people indicated that they had planted pines in the past at the encouragement of the government as a potential source of saleable timber when the trees were mature. This had not eventuated because the timber from pines in the wheatbelt area was not of a millable quality because of the low rainfall in the region.

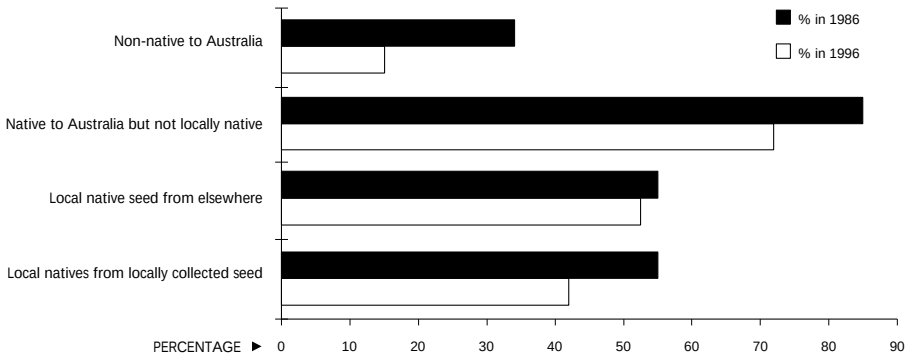
The number of farmers who indicated that they were planting both local natives and non-local natives was less in 1996 than in 1986. The reason for this overall decrease in apparent plantings of all types of species is likely to be a result of the tendency of farmers to have planted only one or two of the species group types rather than a range of different species group types. In the absence of the raw data from the 1986 survey, further analysis of this data pattern is not possible.

Despite the fact that a significant percentage, 52.5% of farmers, said that they were planting trees native to the local area, this figure may be misleading. Many of the farmers who stated they were, then went on to specify that the main species that they had planted were non-native to the area. It seems that farmers are often unaware of the origin of the species that they are planting and rely to a great extent on the recommendations and advice of the suppliers which was mainly a nursery or contract planter.

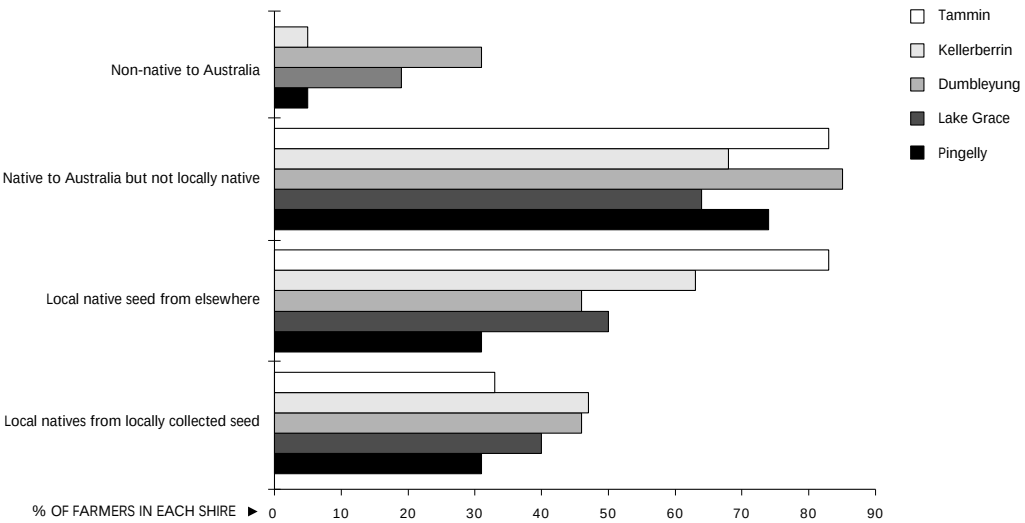
Graph 11: Area of replanting for various reasons (in ha)



Graph 12: The type of species that farmers had planted on their farms



Graph 13: The percentage of farmers who had replanted in each shire, who indicated that they had planted listed species types



Nursery lists generally do not supply information on the locality of origin of species; their order catalogues generally give lists of species suitable for a particular area or soil type only.

7.7 Replanting advice

Farmers were asked to indicate where they obtained information on replanting (Table 14 and 15 contain a summary of the results). Of those that sought advice, 91% said that it had been adequate for their needs. The main source of information was the local nurseries and contract planters, accounting for advice obtained by 59% of farmers and Agriculture Western Australia accounting for 37%. Landcare District Committees, catchment groups and farm journals were mentioned as an information source by around one fifth of all farmers.

Most farmers (91%) said the advice they received on tree planting was adequate for their needs, however, despite this, a number pointed out that some of the species they had planted were unsuitable for the area. One person observed that the recommendation for tree spacing that he had received (about 2–3m) had proven to be too close. In his opinion, it had resulted in adult trees which were straggly and had not reached their full potential. Coastal moorts (*Eucalyptus platypus var. heterophylla)* were planted in Lake Grace by a number of farmers, on advice from various sources. These farmers commented that these trees were unsuitable for the area as they had a tendency to snap off at the base in strong winds.

A number of people who gave an affirmative answer on the suitability of the advice they received did so with the qualification that the advice given was adequate at the time and as adequate as possible for that time given the evolving state of knowledge regarding tree planting. They emphasised that in the early days of tree planting in each of the areas, the information agencies were largely disseminating information that had originally been gained from the farmers themselves through trial and error and that to an extent this was still the case. One farmer wished me to report that he was worried that information currently being given out by various agencies was still inadequate and would be proven to be misleading in the future. He felt that any encouragement to plant non-local species was potentially disastrous. From his own experience, non-local species were unsuccessful in the longer term. He had started planting trees on his farm in the mid 1970s and had planted large areas of non-local native species and some local natives. These had all thrived for the first 10–12 years, but after this almost all the non-local species died. He was concerned that farmers who are currently planting these are yet to experience

Table 14: The agencies from which farmers obtained information on replanting and the percentage who accessed the information using each of the methods listed.

	Percentage of farmers who accessed information using each method						
Agency	Phone	Agent's visit	Field day	Seminar	Workshop	Personal visit	Booklet
Agriculture WA	32	12	39	10	9	27	61
CALM	18	23	23	23	18	47	18
CSIRO	33	50	50	100	17	33	50
DOLA	100	0	0	0	0	0	0
Landcare District Committee	14	25	50	43	46	25	18
Catchment group							
Landcare technicians	16	22	41	19	41	50	12.5
Farm consultants	3	33	16	17	17	17	83
Greening Australia	0	80	0	6	0	4	0
Other farmers	32	8	24	5	8	47	0

their decline. All the local native species from his earlier plantings were still alive 20 years later and he had planted no non-local species in the last 10 years. He experienced a 90% 'planting-out' success rate of seedlings grown from seeds from his own property.

7.8 Grants for replanting and fencing native vegetation

Some farmers had received grants for work to conserve or re-establish vegetation on their farms. The grants were for replanting of trees only, for replanting and fencing of trees or for the fencing of native vegetation to prevent stock entry.

Replanting grants were received by 15% of participants and fencing grants by 26%. Table 16 presents this data with the percentage of farmers who said that they would not have done the work without a grant. Where people said that they would have done the work regardless of the grant, almost all specified that they would not have done so as quickly and that it was possible the work would have been delayed from one to a number of years. The same situation applied to the fencing grants. Most farmers had some or all of their native vegetation fenced from stock (see Table 10 for the percentage of bush fenced on farms in each of the shires). Only a small

Table 15: Sources used by farmers to gain information on the planting of trees and shrubs and the percentage who said that they used that source in 1996 and 1986 (Coates, 1987).

Sources of information for replanting	Percentage of farmers who used source	
	1986	1996
Farm journal/paper	Not asked	21
Television	Not asked	5
Radio	Not asked	4
Book	Not asked	12
Local newspaper	Not asked	5
State or national newspaper	Not asked	5
Farming organisations	Not asked	7
Nurseries/contract planters	37	59
Agriculture WA	22	37
CALM	30	14
CSIRO	Not asked	5
DOLA	Not asked	1
Landcare District Committee	Not asked	23
Catchment group/landcare technicians	Not asked	27
Farm consultants	Not asked	5
Greening Australia	8	4
Other farmers	8	32

Table 16: Percentage of the surveyed farms who received grants for replanting of shrubs and trees and for fencing of native bushland, and the % of those who said they would have done the work any way.

Grant type	Percentage of farms	Percentage who would not have done work without grant
Replanting	15	41
Fencing	26	38

Table 17: The percentage of farmers of the total number in each shire who received grants for replanting and fencing and the mean amount received per farm

Shire	Percentage who received grants		Mean grant amount per farm	
	Replanting	Fencing	Replanting	Fencing
Pingelly	4	8	$1,100	$6,300
Lake Grace	10	23	$2,441	$5,238
Dumbleyung	15	42	$1,230	$4,341
Kellerberrin	23	27	$275	$1,295
Tammin	36	21	$1,950	$3,000

Table 18: The number of replanting grants received by farmers in each shire

Shire	Percentage of farmers			
	No grant	One grant	Two grants	Three grants
Pingelly	96	1	0	0
Lake Grace	90	10	0	0
Dumbleyung	75	9	0	6
Kellerberrin	77	13	0	0
Tammin	64	36	0	0

Table 19: The number of fencing grants received by farmers in each shire

Shire	No grant	One grant	Two grants	Three grants
Pingelly	82	18	0	0
Lake Grace	77	19	4	0
Dumbleyung	58	30	3	9
Kellerberrin	73	13.5	13.5	0
Tammin	79	21	0	0

Table 20: The causes of decline in tree health stated by farmers and the percentage of the total number of surveyed farms where this condition was indicated

Cause of the decline in health of bush	Percentage of farms
Salt/waterlogging	44
Sheep grazing	37
Age and absence of regeneration	27
Rabbits	7
Disease	7
Insects	3
Chemicals	1
Weeds	1
Fire	1
Dryness	1

proportion had received grants to fence and most had used their own money. It would have been very useful to ask farmers to specify the amount of their own money spent on fencing of bushland.

The percentage of farmers who had received grants for fencing and replanting in each shire varied, as did the mean amount received. This information is summarised in Table 17. Concern was expressed by many people that grants always went to the same people and that the grant allocation system was biased towards these individuals. Table 18 and 19 show the number of grants that were received by farmers as a percentage of farmers in each shire who received grants. The data collected in this survey indicates that most farmers have only received one grant.

7.9 Health of native vegetation on farms

Survey participants were asked if the bushland on their farms was showing any decline in health. Of those surveyed, 50% stated that some or all of their bush was deteriorating. The main reasons were salinity, waterlogging, sheep grazing and aging of trees with no regeneration (Table 20). The area of bush affected varied between farms. Table 21 shows areas of affected bush and the percentage of farms with the listed area category

Table 21: The percentage area of remnant vegetation on farms that is showing a decline in health and the percentage of the total number of farms where this area was recorded.

Area of bush (%)	% of farms
0–15	29
16–30	13
31–45	3
46–50	17
61–75	6
76–90	4
91–100	10

8. Attitudes to and management of native vegetation

8.1 Attitudes of farmers to native vegetation

A list of statements about bush were given in the survey. Most of these were taken from the Coates (1987) report so that the responses given in 1986 could be compared with those in 1996. However, it became apparent that the sort of information these responses provided was of questionable value in some cases. The statements and the responses for 1996 and 1986 are presented in Table 22 for comparison. Each of the statements and responses to each are discussed below.

1. Harbours undesirable plants and animals

Most of the farmers who indicated that they agreed with this statement said that they had poison bush (*Gastrolobium sp.*) in their bush; others mentioned specific exotic weed problems. The responses to this statement were similar in 1996 and 1986

2. Native vegetation is pleasing to look at

As in the 1986 survey, almost all of the farmers (95%) agreed with this statement. Only 2% disagreed and these people said that they did not find the type of bush on their farm pleasing to look at.

3. Native vegetation is a fire hazard

Many participants indicated that they did not like the wording of this statement saying that it gave the impression that if they agreed it meant they were likely to regard the bush in a negative way. One person said, '…it's not as if we are going to clear it just because it burns…'. Where people agreed with the statement they emphasised that they were agreeing with what they regarded as a statement of fact rather than expressing an attitude toward bush. Typical responses were: 'Of course it is, if some idiot goes and sets it alight'; '…if lightening strikes it'; '…when it hasn't

Table 22: The responses of farmers to statements pertaining to native vegetation in the 1996 survey. Where the question was asked in 1986 (Coates, 1987) answers given then are included in brackets for comparison.

Statement: Native vegetation...	Agree	Disagree	Neither agree nor disagree	Don't know
1. Harbours undesirable plants and animals	25 (28)	66 (65)	6	3 (6)
2. Is pleasing to look at	95 (99)	2 (0)	2	1 (1)
3. Is a fire hazard	38 (34)	38 (60)	22	2 (5)
4. Is important to control salinity and erosion	94.5 (98)	3.5 (1)	4	0 (1)
5. Is costly to maintain	28 (32)	61 65)	9	2 (3)
6. Is important to conserve flora and fauna	93.5 (96)	2 (3)	4.5	0 (1)
7. Shelters feral animals	89 (99)	8 (9)	5	0 (2)
8. Adds to the property's value	65 (71)	12 (17)	18	7 (11)
9. Is important for stock shelter	81 (97)	7 (3)	2	0 (0)
10. Reduces productive capacity of property	9 (24)	15 (68)	75	1 (3)
11. Is important for farm stability	82 (76)	6 (13)	11	1 (11)
12. Maintenance takes too much time	8 (7)	78 (89)	13	1 (4)
13. Protects rare plants	85	3	11	1
14. Provides corridors for wildlife movement	96	1	3	0

been grazed for a long time and the grass gets high'. The general opinion was that it burned but no more so than a crop.

Equal numbers of people agreed and disagreed with the statement. Where people neither agreed nor disagreed, or disagreed, they either stated that it could be a fire hazard in some circumstances but not in others or that it was a fire hazard being flammable but they were not concerned enough about this to agree that it was a hazard.

4. Native vegetation is important to control salinity and erosion.

Most farmers (94.5%) agreed with this statement. The people that neither agreed nor disagreed pointed out that the issues were too complex to be simplified in this way. A few people stated that as trees died from salt, they could not be said to have an important role in the control of salinity. These same people tended to be unconvinced that the spread of salt was the result of a rising watertable and could therefore be alleviated by tree planting.

5. Native vegetation is costly to maintain.

The majority (61%) disagreed with this statement. All who agreed (28%) cited fencing and the maintenance of fences as the only major costs.

6. Native vegetation is important for the conservation of native flora and fauna

Ninety-three per cent of survey participants agreed with this statement, compared to 96% in 1986. Those that either disagreed, neither agreed nor disagreed or didn't know, responded to the statement as it applied to the bush on their own land. In these cases, they considered their bush to be either too small or too degraded to have a conservation function. There were no farmers who indicated that they thought the statement was not representative of bushland overall.

7. Native vegetation shelters feral animals

Farmers generally agreed with this statement, usually stating that their bush or adjacent bush harboured rabbits or foxes. A few people mentioned cats. Where farmers disagreed, it was because they had experienced no problems in this regard on their own property.

8. Native vegetation adds to the property's value

Most farmers (71%) felt that the value of their property was increased by the presence of native vegetation. One said that it must add some value as he personally would not think of buying a farm that had no native vegetation at all. Others considered this difficult to say for certain as it depended on the attitudes of the buyer. Those that disagreed (12%) did so because they considered that farms were bought only for production purposes and therefore, as bush was 'unproductive' land it would not be attractive to the purchaser.

9. Native vegetation is important for the shade and shelter of stock.

Most farmers (81%) agreed that the stock were better off with some shelter. Where farmers disagreed it was because their bush was fenced from stock and provided little shelter.

10. Native vegetation reduces the productive capacity of my property.

Most farmers (75%) neither agreed nor disagreed with this statement because they did not feel that they knew for certain the balance of the benefits against the costs of decreased workable land area. Where farmers disagreed (12%) it was either because they had cleared and were working almost all arable land or they considered the bush on potentially arable land to be serving a production enhancing function (eg. wind break, watertable regulation). Where farmers agreed with the statement they made a direct comparison of the area of potentially arable land that was uncleared and the potential

income if they were cropping that land. These people generally did not take into account the role of the bush in farm stability.

11. Native vegetation is important for farm stability.

Only 6% of farmers disagreed with this statement, 82% agreed.

12. Maintenance of native vegetation takes too much time.

Survey participants generally disagreed with this statement and many indicated surprise that such a statement would be made. Where farmers agreed (8%) it was because they considered the time spent on fencing of bush and fence maintenance to be considerable.

13. Native vegetation protects rare plants.

Most people (85%) agreed with this, generally saying it was obvious rare plants would be protected if there were any in a particular area of bush. Those that disagreed (3%) did so because their own bush did not have any plants that they considered endangered or rare. The remainder were not sure if their own bush had any rare plants and neither agreed nor disagreed or stated that they did not know.

14. Native vegetation provides corridors for wildlife movement.

Ninety-six per cent of farmers agreed that this was true and regarded this as a positive thing. Some who agreed expressed the view that there were negative aspects to this, mainly the movement of kangaroos from reserves. Only one person disagreed because the bush on his property was, in his opinion, not serving this function.

8.2 Benefits or disadvantages of bush in the shire

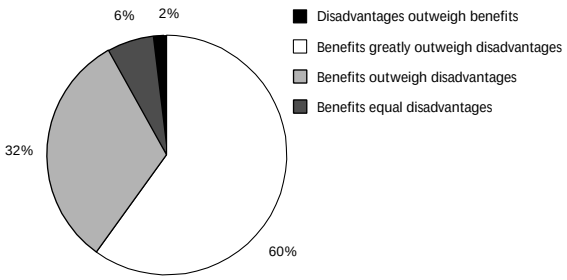
To ascertain how farmers felt about bush in their shire as a whole, they were asked to select a statement which most closely expressed their opinion on the issue. The statements and the responses are shown in Graph 14. It was agreed by 98% that the benefits of bush in their shire outweighed any disadvantages. The persons who felt that the disadvantage of native vegetation on farms in shires outweighed the benefits interpreted the question solely from an economic point of view, saying it was obviously a disadvantage as the shire council did not receive rates for forested land.

8.3 Native vegetation management

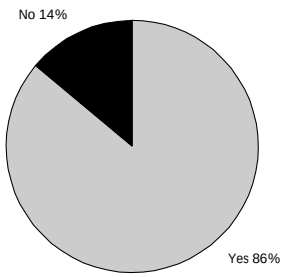
Farmers were asked if they thought that bush needed any management and 86% of farmers said that they thought it did (Graph 15).

All farmers who said that bush did not need any management went on in the following question to say that they would do some things to manage it if they had time and money. It appeared that

Graph 14: The responses of farmers to statements pertaining to the perceived benefits or disadvantages of bushland



Graph 15: The percentage of the total number of farmers who stated that bush needed some management or no management



many had not considered some of the things that they do already as management. For instance, a few people said that you just need to fence it and it looks after itself. They did not perceive the act of fencing to be management, as it was in many instances. (In other cases, the bush had been fenced to protect the stock by keeping them out of areas that contained poison bush). Most farmers said that the most important thing that needed to be done for the maintenance of healthy bush was the exclusion of stock. Table 18 lists management actions for bushland and the percentage of the surveyed farmers who said they would undertake a particular management action 'if they had lots of time and lots of money'.

The responses to these questions, as well as reflecting the farmers perception of the management practices that lead to optimal health and vitality of the bushland in general, largely reflect the type of management that the farmer considered appropriate on his or her farm. For instance, if a farmer did not have a problem with feral animals on the farm, the option of feral animal control was not marked. If they did not have a wetland they did not choose the 'preserve wetlands' option. Some of the responses to each of the management options are discussed below.

1. Fence all bush to exclude stock

Many farmers rejected this option as they felt that there needed to be some bush accessible to stock for shelter, particularly in wet, cold weather after shearing.

2. Control weeds

Many farmers stated that from their experience weeds were not a problem in native bush unless it was disturbed in some way. Others, particularly those with a an exotic grass understorey in some of their bush, considered this a very difficult or even impossible situation to control and did not say they would manage it.

3. Control feral animals

Where farmers indicated that they would not be involved in the control of feral animals on their property it was either because they had no problem with these on their own farm, or they felt that there was no point as nearby reserves contained populations of these animals which were not adequately controlled. A number of people expressed dissatisfaction with the lack of feral animal control that was carried out by CALM on reserves.

Table 23: Potential management action that farmers indicated they would be willing to take 'if they had lots of time and lots of money' expressed as a percentage of the total number of farmers surveyed.

Management action	Percentage of farmers who indicated willingness to take action
1. Fence all bush to exclude stock	73
2. Control weeds	38
3. Control feral animals	83
4. Manage kangaroo numbers	51
5. Replant to thicken degraded areas	54
6. Use fire to encourage regeneration	29
7. Plant a strip of buffer vegetation around remnant	29
8. Plant corridors to connect remnants	40
9. Leave or create special fauna habitat sites	52
10. Replant or manage areas elsewhere to protect from degradation	74
11. Preserve wetlands	40
12. Take care with pesticides/herbicides near wildlife habitat	75

4. Manage kangaroo numbers

The responses to this were based on kangaroo presence or absence on the farmer's property. Where present the perceived level of destruction that the kangaroos caused to the bush or the farm influenced the response. In only one instance did a farmer express concern that kangaroos were a threat to the bush itself. Most farmers said that kangaroo control was necessary to minimise crop damage. This was perceived to be a particular problem by farmers adjacent to reserves. Other farmers said that they recognised the need for kangaroo culling under some circumstances but that they would not have the heart to do it. Many people indicated that they liked to have kangaroos on the property and that they thought 'a few trails through the wheat' worth putting up with.

5. Replant to thicken degraded areas

Fifty-four per cent of people said that they thought it would be necessary to thicken degraded bushland by seeding or planting; they often had patches of bush that had degenerated quite badly as a result of stock grazing and recognised that its natural regenerative ability was severely impaired. It was considered by the remainder of farmers that the bush regenerated in a satisfactory way if fenced from stock and left alone.

6. Use fire to encourage regeneration

This management action elicited varied responses. Many people who felt that their bush needed to be burned to encourage regeneration had not done so because they recognised that they had insufficient knowledge of the effects on the vegetation and the wildlife. Where people stated that they would be prepared to burn bush, they qualified this by saying that this would be only if they had input from experts.

7. Plant a strip of buffer vegetation around remnant

Many people questioned the meaning of the word buffer in this context. It was explained that it would be the planting of trees or shrubs around a small remnant to protect it from the effects of wind and to increase the habitat area available to resident wildlife. Only 29% thought that they would do this.

8. Plant corridors to connect remnants

Some people (40%) felt this to be an extremely desirable thing to do for the benefit wildlife on the farm and for aesthetic reasons. Others made it clear that they thought such a concept ridiculous and could not conceive of any 'serious farmer' getting involved in such schemes.

9. Leave or create special fauna habitat sites

Most farmers felt that they already left fauna habitat sites by not removing dead trees and fallen logs. Some farmers considered the creation of habitat for wildlife to be one of the main reasons for the replanting of vegetation. One farmer had created bird nesting boxes with great success, in particular having had a pair of duck nesting in one box for a number of years.
A number participants made it clear that they thought concerns with wildlife to be superfluous to farming operations and did not give it any consideration. One person pointed out that he considered hollow logs more likely to provide habitat for rabbits than wildlife and he routinely destroyed or removed them.

10. Replant or manage areas elsewhere to protect from degradation

Most participants (74%) thought they would do this. Some specified that if the replanting needed to be done off the farm then it would not be considered.

11. Preserve wetlands

Some farmers (40%) marked this action although most either did not have wetlands or did not consider their salt lakes to be wetlands. Only two farmers recognised their salt lakes as 'wetlands'. The question prompted one of these people to describe the species of water birds that could be observed in the winter. There is clearly a need for residents of regions with seasonally inundated salt

lakes to be made aware of the ecological importance of these. A number of people considered their salt lakes to be perfect rubbish dumps as the saline conditions rapidly corroded tin cans etc.

12.Take care with pesticides/herbicides near wildlife habitat

The responses of many farmers to this question suggested that they found it a little insulting that the question was included, pointing out that this was done as a matter of course by all farmers. It is noteworthy, however, that not all farmers indicated that they would do this.

8.4 Bushland management advice

To ascertain where farmers were likely to go if they wished to obtain management advice for their bushland, they were presented with a list of options and asked to indicate one or more. They were allowed to fill in any other agencies or sources that had not been listed. The results of this question are summarised in Graph 16 and Table 24. Agriculture Western Australia was the most frequently selected option (71%), followed by catchment groups and other farmers (both 52%) and CALM (37%). Of note, is the higher percentage of farmers who indicated they would seek information from CSIRO in Kellerberrin (36%) where that organisation has a concentrated research presence compared to the other shires (8–14%).

8.5 Percentage of farm to be left as bush

Participants were asked to decide, taking into account their current knowledge, experience of their farms and the land degradation problems in the area, how much of their land they would leave as bush if they were to clear it today. Responses to this varied greatly, to a large extent dependent on the extent of an individual's land degradation problems or on natural features specific to the particular farm. For instance, if a farmer was in the low lying area and had a lot of salt affected land he or she was more likely to specify a greater amount of land that needed to

Graph 16: the percentage of farmers who indicated that they would seek management advice from the following agencies or sources

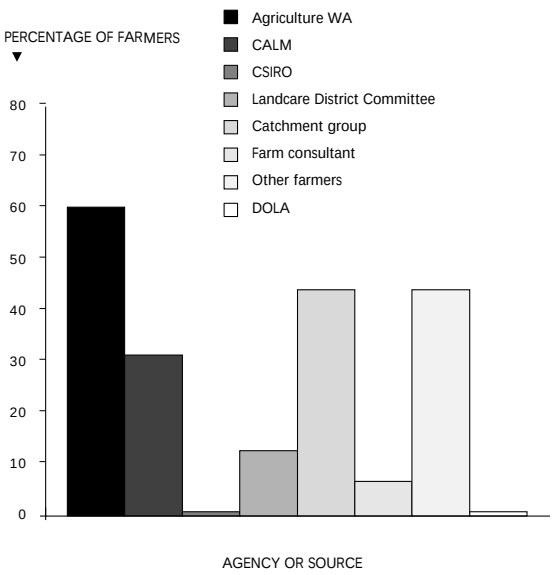


Table 24: The percentage of the farmers in each shire who sought management advice from each of the listed agencies.

	Percentage of farmers who sought advice				
Agency	Pingelly	Lake Grace	Dumbleyung	Kellerberrin	Tammin
Agriculture WA	62	92	45	68	71
CALM	50	32	42	27	36
CSIRO	8	11	10	36	14
Landcare District Committee	66	44	31	54	36
Catchment groups	33	46	61	68	64
Farm consultants	8	3	19	4	7
Other farmers	54	44	31	45	42
DOLA	1	1	0	0	0

Table 25: The amount of bushland, expressed as a percentage of the total area, that farmers indicated they would leave on their property if they were to clear the farm today with their current knowledge of the land, and they would clear if all land was arable.

Percentage bushland to be left on property	Percentage of farmers	
	Farm 'as is'	If all land arable
0–5	3	10
6–10	17	25
11–15	14	15
16–20	34	33
21–25	13	8
26–30	12	6
31–35	2	1
36–40	2	1
41–45	1	0
46–50	2	0
100	1	1

Table 26: The reasons farmers have left bushland on their properties.

Reason for leaving bush	Percentage of farmers		
	Main reason	Secondary reason	Total who cited reason
Land not suitable for cropping	64	13	77
Clearing cost prohibitive	4	22	26
To preserve flora and fauna	46	19	65
Erosion control	57	16	73
Soil salinity control	54	10	64
Preservation for future generations	53	16	69
Scenic reasons	32	22	54
Shade and shelter for stock	64	24	88
Not allowed	2	0	2

be left under natural vegetation than someone on higher land who had little or no personal experience of the problem. Similarly, if a property had large areas of salt lake or rock, the amount of land to be left as bush included this area.

Farmers were then asked if the amount of land left as bush would be the same if all land on the farm was arable. In some cases, the amount was the same as given for the previous question, and in others much less. In two instances, respondents said they would leave no vegetation whatsoever. Table 25 contains a summary of the responses of farmers to the two questions on the area of bushland to be left if clearing was to be done today.

All farmers readily cited areas on their farms where they believed that bush should have been left. The responses consistently mentioned the following types of areas:

- tops of hills
- groundwater recharge areas
- sandy country
- rocky country
- fencelines
- nature conservation areas
- around the house
- stands of unique or visually attractive vegetation
- buffers around salt lakes

8.6 Reasons for leaving bush

Farmers were requested to indicate whether any of a list of reasons corresponded to their own reasons for leaving remnant vegetation on their property. There was a tendency to interpret the question to be asking why the bush was originally left there. Where this was realised to be the case the surveyor pointed out that the question asked for their own reasons for having left it there. Table 26 presents the responses of the farmers to this question.

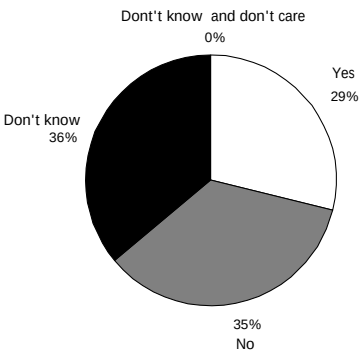
8.7 Endangered plants or animals

Participants were asked to indicate whether they had endangered plants or animals on their property. Farmers decided for themselves if animals and plants were rare or endangered. For instance, one farmer said he had a single plant on his property that he had not seen elsewhere. In his view, this was endangered. Animals mentioned included the chuditch, which were considered very rare in the area in which they were seen, numbats and echidnas. A few had animals or plants on their properties which were under the management of CALM.

The results of the question are summarised in Graph 17, however, the responses are not a true indication of whether or not farmers recognise the presence of such species on their farms. A number (around 3%) of those who marked 'no' indicated to the interviewer that they did have a rare species on their property but were unwilling to record it on any official document to avoid repercussions to their response (Notably, most of these farmers were in Lake Grace). Even when it was explained that this was unlikely, the farmer chose to stay with the negative response. These farmers explained that they did not want to have government people on their farms telling them what to do. In particular, CALM was mentioned, a number of farmers expressing dissatisfaction with the 'attitude in general' of CALM personnel toward farmers. When questioned further, it was apparent that some people based their belief on hearsay from other farmers and some had had unsatisfactory dealings with CALM themselves. For instance, one farmer who had found an endangered animal on his farm, for which CALM had been searching just a few weeks before, said he had no intentions of notifying the department because of a minor conflict with a CALM employee over an unrelated issue.

There were possibly others with endangered plants or animals on their properties who also chose to withhold the information but gave no indication that they were doing so. In contrast, there were a number of people who were very proud of the fact that they had rare animals or plants on their properties. In the shires of Kellerberrin and Tammin, there were no individuals who expressed negative attitudes toward the presence of these.

Graph 17: The indication given by farmers as to whether they had endangered plants or animals on their property



9. Incentives for bushland care and replanting

9.1 Incentives to protect and replant

Questions were asked to assess how farmers felt about incentives for better care of bushland, the planting of more local native vegetation and grants for fencing of remnant vegetation. Farmers were given various incentive options and asked to specify those which they felt applied to themselves or to write in others.

9.2 Incentives to replant more local vegetation

Farmers were offered the choice of various possible incentives and asked to indicate those that they felt were sufficiently attractive to prompt them to plant more local native vegetation. They were allowed to specify more than one option and to write in other options. Table 27 shows the responses. A number of farmers (77%) indicated that they would like better financial support, 37% that they would like to be able to plant commercially useful species, 26% desired better methods of direct seeding to plant large areas quickly and 20% information on alley farming.

9.3 Incentives to better protect/manage bush

Participants were asked to indicate whether any of a list of possible incentives would induce them to better manage and/or protect their bushland. They could mark more than one option. Table 28 summarises their responses. Many (73%) indicated that better financial compensation for time and materials was desirable; 50%, information on bush management; 31%, a visit from someone who could provide a feasible bush management plan and 15%, better compensation for unused land. Some (2%) said that nothing would induce them to better manage the bush because they already considered current management to be satisfactory.

Table 27: Incentives to plant more local native shrub and tree species and the percentage of farmers who chose these incentives.

Incentives to replant local species	Percentage of farmers who agreed this provided an incentive
Availability of commercially useful species	37
Better methods of direct seeding	26
Better financial support for planting	77
Information on alley farming for local soils	20
Nothing	3
* Tax incentives	5
* Information on animal habitat types	1
* Money for fencing	2

* Incentives written in by farmers.

Table 28: Incentives to better manage/protect bushland and the percentage of farmers who chose these incentives

Incentives to manage/protect bush	Percentage of farmers who agreed this provided an incentive
Better financial compensation for time and materials	73
Better compensation for unused land. (eg. rate exemptions/reductions)	15
Information on bush and benefits of management	50
A visit from person who could provide a feasible management plan	31
Nothing	2

9.4 Fencing grants for remnant vegetation

There are currently a number of grant schemes available for the fencing of remnant vegetation from stock. All farmers interviewed were aware that such schemes existed. They were requested to choose which one of three listed schemes they would find attractive. These schemes all included the signing of a contract to protect the remnant for 30 years with a memorandum on the title to ensure that if the land was sold, the new owners would be obliged to do the same, and rate relief on the area protected. Only the amount of money differed, the options were either $600 or $900 per kilometre, or $1,200 per kilometre. It is considered that the total cost of labour and materials for fencing is $2,400 at current rates. If none of the options suited the participant they were asked to write in one of their own. Some farmers were not interested in grant schemes at all, preferring to do the work themselves and chose not to answer the question. A few farmers had already fenced all bush or considered that they had none to fence. These people also chose not to answer the question. The responses are presented in Table 28a.

Some farmers did not approve of the condition of a contract with grants. Although, 52% were happy with contracts, 11% said they would prefer a negotiable contract that would allow stock shelter after shearing and emergency grazing and 13.5% said that they would like to have grants with no contractual obligations. Of farmers who responded, 6% said they would rather the government provide tax deductions than grants.

9.5 Responsibility of various groups for the management of and provision of money for bushland on farms

To determine where farmers felt the money should come from for retaining bush on farms, they were requested to indicate whether the farmers, the shires, the State or Federal government, or community and voluntary groups should contribute to the costs and if so the proportion of the contribution. They were then asked which of these should be involved in the management decisions related to retaining bush on farms. Table 29 presents the responses to the question on provision of money and Table 30 responses to the question addressing management decisions. The provision of funds was generally considered to be something which all the listed organisations could contribute some money to. Management decisions were

Table 28a: Incentive schemes for fencing of remnant vegetation and the percentage of the total number of farmers in all shires who indicated they were interested in such a scheme

Type of incentive scheme		Percentage of farmers
$600 per km	– Contract, memorandum on title and rate relief	3.5
$900 per km	– Contract, memorandum on title and rate relief	10.0
	– Negotiable contract	1.0
	– No contract	2.0
$1,200 per km	– Contract, memorandum on title and rate relief	31.0
	– Negotiable contract	8.0
	– No contract	10.5
Total cost per km	– Contract, memorandum on title and rate relief	8.0
	– Negotiable contract	2.0
	– No contract	1.0
150–200% Tax deduction		6.0
Chose not to answer question		17.0

considered to be left predominantly to the farmer with input from the other organisations. Of farmers who responded, 62% felt that the Federal government should have no say in bushland management on farms.

The participants were asked if they had any ideas on the way in which money should be raised for the funding of landcare work. The question was optional and only 27% responded. The sources of funds specified are listed in Table 31 with the percentage of farmers (of the total number) who stated that source.

Table 29: Potential sources of funding for the costs involved in native vegetation on farmland and the percentage of farmers who indicated the proportion of funds that they thought should come from each.

	Proportion of contribution		
Source of money	'A lot'	'Some'	'None'
Farmers	19	73	8
Local shires	3	57	40
State government	27	66	7
Federal government	46	48	6
Community or voluntary groups	1	36	63

Table 30: Potential sources of decision making regarding native vegetation on farms and the percentage of farmers who indicated the proportion of the input they considered should come from each

	Proportion of contribution		
Management decision makers	'A lot'	'Some'	'None'
Farmers	82	18	0
Local shires	16	59	25
State government	10	50	40
Federal government	6	32	62
Community or voluntary groups	7	43	50

Table 31: Potential sources of funding for landcare work and the percentage of farmers who suggested this source.

Source of funds	Percentage of respondents
Increased allocation of general taxes	11
Landcare levy on all wage earnings	7
Tax incentives	6
Goods and services tax	1
Food tax	1

10. Farmers' comments

10.1 Farmers' comments

All those who participated in the survey expressed their views on issues related to native vegetation and landcare, often prompted to bring up a particular topic by a specific question. Additionally, farmers were requested to write down any comment on any issue related to native vegetation on farms, land conservation etc. in Section D of the survey. This gave farmers an opportunity to elaborate on any of the preceding questions in the survey and to put into print any of the issues raised during discussion. All the comments have been listed in Appendix A, under headings appropriate to the issues dealt with. These are discussed below and where the recorded responses do not adequately convey or completely cover the issues raised, comments made during the discussion are mentioned also. Issues that have already been mentioned in the sections dealing with each of the survey questions are not discussed again to avoid repetition, unless they are particularly relevant.

Many of the comments made in Section D were critical or 'negative'. It should be noted that the relative absence of positive statements does not indicate that such views did not exist, rather that the farmers perceived the section as an opportunity to comment on issues which they felt needed attention by the government.

10.2 Land degradation

All farmers surveyed were aware of the problem of land degradation in the form of salinity and erosion. All but one expressed concern at the problem and realised that action on the part of the farmer was necessary to control it. The individual who showed no concern for the problem at all was a very elderly farmer who had no family to pass his farm onto. It could be surmised from his overall attitude that he was very aware that the expansion of degraded land in the future was not going to effect him personally and for this reason chose to be disinterested. As he said, his '…farming days are just about over'.

Almost all people brought up the issue of the immense costs, in time, labour and money, involved in implementing landcare practices aimed at addressing land degradation. Farmers wanted to emphasise that they were in a business on which their livelihood depended and that they could only spend a limited amount of money on landcare and still maintain a viable operation. Many people admitted to feeling daunted by land degradation, especially the spread of salt-affected lands and a few felt quite hopeless about the future outlook for the wheatbelt farming community.

10.3 Remnant vegetation

There was a universal recognition of the advantages of having some bushland on farmland. The perceived advantages differed from farm to farm, apparently partially dependent on the amount or type of bush that there was on the property, of the interests and concerns of the farmer. Most people were convinced that the presence of trees on the farm had a role in maintaining soil and hydrological stability. Many expressed concern at the degradation of their bush which had occurred over time; quite a few reminisced about beautiful plants that had disappeared from their bush.

In most cases, the degradation of the condition of bushland was blamed on sheep. Repeatedly, the destructive nature of sheep to bush was mentioned, describing how they trampled or nipped off new seedlings as soon as they appeared above the ground and ringbarked trees. Loss of species, lack of recruitment of new species and degeneration of older trees was attributed to the presence of sheep. One person quite seriously suggested that a cost appraisal should be made to ascertain whether the money

spent on fencing degraded bush would be better spent on a scheme to compensate farmers for the removal of sheep from farms. He suggested that all the money and time spent on fencing of bush and maintaining fences over the years may be more than keeping the sheep is worth.

Many people were very proud of their bush, especially if they considered it to be in good condition, or if they had a especially large area and were proud of their own or their forebears foresight in leaving bush. Its role as a habitat for local wildlife was perceived as an asset in most cases.

Concern was expressed by many people at the loss of patches of trees as a consequence of the rising watertable and spreading of salt affected land, or as the result of problems which they were unable to identify. Many expressed sadness at the loss of old trees. In a few instances loss of trees was attributed to dieback disease (caused by the fungus *Phytophthora cinnamoni*) although no-one had had its presence confirmed. The relatively low annual rainfall makes the presence of Phytophthora dieback unlikely.

10.4 Flora and fauna

The intrinsic value of native flora and fauna was recognised by most people, as well as the desirability of preserving it. Overall though, there was a general lack of recognition of the diversity of plants and animals in the area. When questioned about wildlife on their farms, survey participants usually talked only of the most visually prominent animals on their farms, usually kangaroos, galahs or ring-neck parrots.

There seemed to be a widespread ignorance of the interconnectedness of the members of an ecosystem and of the web of interactions necessary sustain a single species. Repeatedly, farmers made statements that made this ignorance obvious, even though most had made it clear they were conservation minded. For instance, one person expressed an interest in the bird life on his property and of preserving it, whilst at the same time wishing to emphasise that they were the only things he was concerned with and that he did not care about 'little creepy crawlies or anything'. It did not seem that he had made the connection between 'creepy crawlies' and a food source for birds.

Where farmers had noticed a decline in the species diversity of their bush, they often expressed concern and a feeling of helplessness that they did not know how to manage it to bring the animals or plants back. However, not many of these people said that they had sought advice from an authority to find out how they could manage their bush.

Around 10% of farmers said they thought about the value of the plant species that they were planting, as habitat for wildlife or to recreate the natural ecosystem. A few farmers were actively involved with organisations such as CALM and the Malleefowl Preservation Group, managing and monitoring local populations of rare plants and animals on their properties.

One particularly conservation minded farmer pointed out that there was a scarcity of books and information about plant and animal species of the wheatbelt and that if more were available farmers would become much more involved in wildlife conservation. She felt that information needed to be presented in a way that made the farmers appreciate the 'beauty and richness of the area'. She considered a way of achieving this was by giving locals the impression that people from outside the area thought it was valuable. She thought books and television documentaries would be effective. The need for more biological surveys of the region and more scientific interest was also stated.

A few farmers made expressions of concern about the problems of having local native fauna and flora on a farm or close by. One said that he had a problem with wedge-tailed eagle taking lambs and another with kangaroos, from an adjacent reserve, putting trails through his wheat. The presence of box poison (Gastrolobium sp.), which is toxic to stock, was mentioned by many farmers as a hazard of having bush on the farm.

Overall, however, farmers appeared to believe that the advantages of having plants and animals on the property were worthwhile, despite any problems.

10.5 Clearing

Most farmers were of the opinion that too much bush had been cleared in their shires, and had no intention of clearing more. Two farmers (one in Lake Grace and one in Tammin) firmly believed that clearing the country had been a total mistake. Many people cited the early clearing policies of the government as the cause of over clearing and the associated land degradation. They considered that if the government put as much effort into encouraging replanting as had originally been put into promoting clearing, the wheatbelt would be in a much better state. Some also considered, that the government should provide a financial incentive or compensation for leaving bushland, as in many instances it reduced the area of productive land.

One farmer was extremely annoyed at the government's current policy which effectively bans clearing in shires where the total vegetation is less that 20% (see Section 3.3). He had over sixty per cent of his farm area as native bush and had a long term clearing plan that was to proceed in a manner which allowed enough land for his sons to join him in working the farm when they reached adulthood. He had been given approval for the plan by Agriculture Western Australia prior to the changing of the clearing regulations. He is now in a position where he is not allowed to clear any land and feels sorely cheated of the livelihood that he had planned for his sons and for their inability as a result to live on the property with him. He was very angry that there was no form of compensation available to him and considered that the 'system' had penalised him for a responsible attitude to land clearing, the same system that had encouraged the over clearing.

Some people were concerned that clearing still went on despite the laws which restricted it and thought there should be better enforcement of clearing laws. It was observed that small areas of bush were constantly being cleared for various reasons including the replacement of boundary fences and to widen roads. The Main Roads Department and the shire road workers were criticised for the amount of clearing they did, much of which was considered unwarranted or avoidable with a little forethought. The digging of gravel pits for roadworks on private property was a concern of three survey participants. One person had prevented shire workers from taking gravel from his land as they were about to destroy an old stand of *Xanthorrhoea sp.* on his property which he particularly valued. He said that permission had not been asked and when he challenged the workers, they informed that as they were legally entitled to take gravel from unfenced bush and they would go ahead anyway. At the time of the survey, his protestations had been heeded by the shire but he was eager to fence it as he was sure that they would eventually exercise their right to take the gravel. He had a grant application for fencing under consideration at the time and was hoping for a positive outcome to protect his bush.

Expansion of or redirection of roads was considered a steady method of destroying bush. One farmer described how she had stood in front of the shire bulldozer so that they could not knock down a stand of 'huge salmon gums' behind her property. They had already knocked down half of them before she arrived. The workers said the reason for the roadwork was to allow harvesters to traverse the road with greater ease. The farmer considered the reason ridiculous.

A possible method of saving established bush along roads and using it as a focus around which to plant more was put forward. It was considered that the Main Roads Department and the shires should buy farmland adjacent to existing roads from agreeable farmers, where expansion of roads necessitated the clearing of trees. New roads could be constructed on the farmland and the bushland saved. The old road could be ripped up and planted with local native vegetation.

10.6 Replanting

The need to replant trees and shrubs to lower the watertable was widely, but not universally, recognised in all shires. A small number of farmers were not convinced that the planting of trees was the answer to the problem of salt land spread and had chosen to concentrate on earthworks, particularly Whittington's interceptor banks (see Section 11.10), as a potential solution. These people did not believe that a rising watertable was the causative factor.

Of those people that were planting trees, all stated that the rate of planting was restricted by the amount of money that was available to them and the amount of time that they could afford to spend on this activity. Some said that they would like to see Agriculture Western Australia provide farmers with better information on the financial costs and projected returns over time, so they could better judge the amount of money that should be spending on planting. One of the farmers who was doing very little tree planting and indicated he probably would not do much in the near future, stated that he thought he was better off putting his money into sure returns in the present rather than into possible future profits that hadn't been convincingly demonstrated as far as he was concerned.

Various complaints were made about a lack of available information on aspects of planting local native species and a lack of encouragement from government departments to plant local natives. One person said that he could not get information from 'anyone' on how to establish a natural understorey in his bush which had been grazed for years by sheep. Another farmer pointed out that there was a great resistance to the planting of local native species where these were mallees, shrubs or grasses. In her opinion, most farmers liked a big tree, largely for its visual impact. She considered part of the reason for this, in wheatbelt areas, to be the association made between big trees and better soils which naturally supported them.

The cost of fencing off seedlings was considered to be the greatest disincentive to planting trees and shrubs. Different people said that they would like to see: more financial incentives for replanting and fencing of replanting in the form of grants; the availability of free trees; and demonstrations of windbreaks and alley farming in their areas.

10.7 No tillage cropping

A few survey participants used no-till practices. They were convinced of the benefits to be gained from this type of farming and wished to see the government encourage and provide subsidies for the purchase of no-till equipment. This is very expensive compared to more traditional machinery. One person said, 'After using this method, I'm convinced that the widespread use of this method would be as valuable or more valuable than tree planting. It improves soil structure and water holding capacity and prevents erosion.'

10.8 Landcare

There were many negative comments made about the landcare movement, dealing with a range of issues. The most common grievance was that too much money was spent on administration and infrastructure and not enough 'on the ground'. One farmer, however, questioned this, saying that many people did not understand that it takes considerable financial input to set up any system, especially one as wide-spread and ongoing as landcare. He thought the results of money spent in the present were likely to continue to be seen for the next century.

A few people wished to remain outside the landcare organisation because it did not condone extensive earthworks for water redirection. One farmer said that the 'attitude of landcare' discouraged experimentation with methods of addressing the salt problem apart from tree planting.

There was a reluctance of some people to participate in landcare groups for different

reasons. Some considered them to be 'too slow moving', others felt the commitment of all members was not equal and were frustrated by this. It was mentioned that farmers at the top of catchments often did not get involved in the groups as they did not have severe salt problems and were therefore disinterested. A few farmers felt landcare groups were just systems for the extraction of government money or venues for farmers with aspirations for a high community profile. One participant said that it was inevitably the farmer whose land could be seen blowing away in a windstorm, that was a 'landcare award winning farmer' and always had his photo in the local paper. One participant said that he was annoyed that all the landcare meetings were put on during the day, the farmer's most productive time because this was when the landcare officers were paid to work.

The greatest cynicism toward landcare was evident in the shire of Lake Grace. In many instances, farmers in this shire said that they were part of a catchment group that had formed but never got together again, or that had no momentum. There were also a number of criticisms directed at particular people who were involved in coordinating landcare in the shire. One person complained that the landcare officers did not arrive in the shire with adequate qualifications or understanding of farm operations. He complained also that for the first 6–8 months after a new officer's arrival they were out of the area doing courses.

Despite all the criticism that people wrote down in the survey, there was an equivalent amount of positive verbal comment. Apparently, farmers fall in to two fairly distinct 'camps' on the issue, either those completely for it or those completely against it. The interviewer gained the impression that a lot depended on the personality and acceptance by the community of the individuals who were coordinating activities. The farmers in Dumbleyung shire were particularly enthusiastic about landcare and often cited the landcare officer's name in that shire. No negative comments about the landcare movement were recorded in the shire of Pingelly and Dumbleyung.

10.9 Women

It was commented by a few male farmers and one female farmer that there should be a greater participation of women in organised landcare. It was perceived that the low rate of participation of women resulted from a of lack community encouragement. It was obvious though, that the level of informal participation in landcare was high on many farms, as it was the female partner that was responsible for growing, ordering and deciding where trees needed to be planted. Male participants in the survey often asked their female partners to inform them of the species of trees that had been planted on the farm when asked that question in the survey.

10.10 Whittington interceptor banks

The issue of Whittington's interceptor banks aroused great passion in both their opponents and advocates. Advocates of these banks consider the cause of waterlogging and salinisation to be the development of perched soil water in low lying areas and not a rising watertable. The interceptor banks are excavated to divert overland flow and throughflow away from salt affected areas (Ghassemi *et al*, 1995).

The interceptors were first constructed by a Brookton farmer, Mr. H. Whittington in 1954, after the failure of the of planting of salt tolerant plants and contour banks to improve his salt encroachment problem. They were designed according to the advice of the United States Department of Agriculture. The banks are constructed by bulldozer along contours. The machine gouges out a gentle sided ditch to a depth that penetrates below the subsoils where the clay content is higher. The clay soil is pushed up against the bank of excavated spoil below the ditch to prevent leakages when it fills (Conacher *et al*, 1983a).

The banks have been largely discredited by research conducted in Western Australia which has concluded that the banks have little effect in improving land that is severely salt affected (eg. Holmes, 1979; Conacher *et al*, 1983a and b; Henschke, 1989). Localised reduction in waterlogging of soils has been recognised by researchers as a result of waterlogging control where surface or subsurface flow of water has been effectively regulated (eg. Barret-Lennard, 1986; Henschke, 1989). In other localities, this is not the case and leaking banks allowed water to flow both laterally and vertically producing increased waterlogging and discharge to the groundwater (Henschke, 1989).

Three farmers in the survey were strongly in favour of these banks and claimed to have had remarkable success. One was also planting a large number of trees over his property as he considered that both were needed to effectively deal with salt. The remaining two were not planting trees and did not intend to, considering them to be a waste of time as they were not going to solve the perched watertable they considered had caused the salt problem. Both these farmers were angry that Agriculture Western Australia was not researching the system and were discouraging farmers from using it. When it was pointed out that there were many other farmers who had had no success with the banks this was attributed to poor construction or inappropriate placement. A small number of other farmers said that they would like to see more research into 'earthworks'.

A small number of farmers stated they were strongly against the banks, having had personal experience of them, with no improvement in their salt lands. All mentioned the large cost of construction, which was considered to have been wasted money that would have been better spent on planting trees. One person stated that regardless of claims of success, they had created more problems than they had solved. He was at the time employing a bulldozer driver to fill his in and was annoyed that the same driver was also currently employed on another farm in the area, constructing them. One farmer told of his neighbour who had placed a large sum of money into interceptor construction and had seen no improvement in his land at all. This person had become bankrupt as a result and had to leave the farm.

10.11 Fencing grants

Survey participants made comments on a range of issues pertaining to the provision of grants for fencing. The costs of administering the grant scheme and the balance of money that reached the farmers was raised often. There appears to be a perception that a large proportion of funds for the schemes are spent on things other than fencing. Some considered that there should be no grants at all and that farmers should pay for all fencing on their own property and that the money could be better spent on other landcare work such as tree planting. One farmer who was not convinced that the presence or planting of trees had any effect on salt land spread said he thought the money from the grant scheme 'would be better spent on research to find out the real way of combating salt'. The majority, however, felt that the grants scheme was a good incentive to protect bush but expressed views on aspects of the scheme which they considered problematic.

Quite a few people were concerned that grant distribution was inequitable with farmers who 'make all the noise' or wealthy influential farmers receiving the majority of grants. Others were discouraged for re-applying for grants after rejection of an application, complaining that they did not receive sufficient information on the reason for rejection. Where this was the case farmers had often fenced their bushland, or were intending to do so, using their own money.

A few people said they would like to see the introduction of fencing grants for the fencing of large areas of salt land, particularly salt lakes. It was suggested that if farmers fenced at a distance from the boundary of the salt land, they could keep stock off the land adjacent to the salt and allow some recovery of the natural vegetation. At the same time they could be planting areas that

were particularly degraded and where it was considered that the greatest watertable lowering effects were likely to be achieved.

Many people commented upon the complexity of the grant application forms, the time that it took to prepare them and the time they took to be processed. One person who had applied for three fencing grants, all of which were rejected, was sure the reason for rejection was his inability to use the language and terminology that the grant administrators expected. He had chosen not to reapply and had spent $12,000 of his own money to do the fencing.

Some farmers disagreed with signing a contract to manage the bush in a manner which maintains its conservation value, as a condition of fencing grants because they felt the money provided in the grant was disproportionate to the expectations and time span (usually 30 years) of the contracts. Some said they would not consider a contract as they did not know what potential sustainable uses for their bush there could be in the future. Potential uses that were cited were ecotourism, harvesting of wildflowers, harvesting of firewood, collecting seeds and medicinal plants.

A group of people were of the opinion that the necessity for the contract system was a 'dated' concept and that farmers these days were sufficiently conscious of bushland preservation to manage it in the same way as specified in the contract anyway. Others disagreed with this and said that if there were no contracts then there would be people who would abuse the grant system and manage their bush in a manner inconsistent with the aims of the schemes. Many people had no problem at all with the contract system saying that long term preservation of the bush was the goal of fencing and that the providers of the money had a right to apply conditions to its supply.

10.12 Labour and financial support

Additional funding and expansion of existing support schemes for landcare and bushland preservation were considered desirable by many farmers. They felt that the amount of money available was totally inadequate to make any measurable impact on salt encroachment or nature conservation. Many people said they felt they were 'running out of time' to deal with these things before the situation reached a critical stage at which it would be no longer feasibly manageable. A few people said that the provision of free trees would be a useful way of getting more trees planted in their shires.

The allocation of time and labour to landcare work was an issue for many farmers. They wished to emphasise that they had to devote whatever time was necessary to the production side of farm operations, and could only spend the time left over on landcare work. They thought that assistance with finances to pay hired labour would allow them to speed up the progression of this work.

10.13 Tax incentives

The introduction of greater tax incentives for landcare works was considered by many to be the best method of contribution of government monies. It was felt that if properly designed, such a system would negate the need for administrative bodies for grants. As previously mentioned there is a widespread perception that administrative costs are high and some people believe that the schemes have been created solely to 'provide jobs for bureaucrats'.

The desired rates of tax deductibility for landcare work were 150–200%. This would allow some return to the farmer for time spent performing the work, with the base cost calculated on expenditure on materials and trees. At present, farmers can get a deduction of one hundred per cent of the cost of materials etc. This was not considered to be an incentive as there were many other things on the farm that earned the farmer a better overall deduction that contributed more directly toward increasing farm income such as updating machinery and buying fertilisers. It was communicated by one farmer that it was prevalent

in his shire for farmers to spend large amounts on things that they did not really need for a direct and easy tax deduction rather than spending time planting trees or fencing bush which require hours of work which were not tax deductable. He felt that the introduction of 200% tax incentives would get landcare progressing at a rapid rate. One person pointed out that tax incentives of 150% had been introduced to encourage the clearing of the land and saw no reason why the government should not 'take responsibility for their policy mistakes' and introduce a 150% deduction for replanting.

10.14 Government departments

There were a range of comments made about the policies, mode of operation and efficiency of government departments. Decision makers and other employees were considered by some to be 'out of touch' with the realities of farming and the problems farmers faced and in some cases unwilling to consider the opinions, advice or views of farmers.

Agriculture Western Australia (Agriculture WA)

A few people wanted to inform the interviewer that they found AGWA a difficult organisation to track down information within. They described seeking advice by telephone and continually being transferred form one person to another without achieving satisfaction. A lack of practicality of information was cited.

The need for more research into salt affected land and salt encroachment was identified. One farmer said he would like to see the department buy badly salt affected properties for experimentation which could be used as models of management which farmers in the area could follow. A particularly scathing comment from one farmer was related to what he perceived to be a lack of direction in research by the department. He felt that: 'The Ag. Department could bloody disappear and none of us would even notice or be any worse off' and was 'sick of them doing research into things I already know'.

Agriculture WA also received many comments of praise from farmers on their activities but none of these were documented on the survey form.

Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Only one comment was made about CSIRO, by a farmer in Kellerberrin. He said that he was aware of the valuable nature conservation work by CSIRO that had been underway for many years in his shire, but not the specifics of what had been found during research. He said he would like to see more accessible information for the public on local research. The only literature he had been able to access had been in a format that was unintelligible to him.

Department of Conservation and Land Management (CALM)

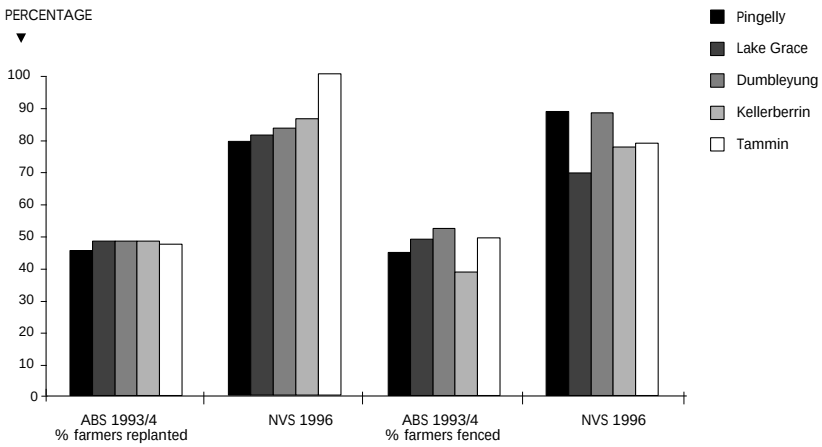
CALM attracted a lot of criticism over a range of issues. Reserves were not considered to be adequately managed, with farmers concerned over lack burning of bush to eliminate potential fire hazards, absence of fire breaks around the reserves and lack of feral animal control. One farmer said, 'If they'd just shoot one fox it would be a start'. The role of CALM in the protection and management of rare and endangered animals was not perceived well with a few farmers expressing annoyance at CALM's 'telling them what to do' on their 'own property'. There was little faith among the critics of the department that it had enough knowledge to be doing the job it was supposed to do. According to one person he had been visited by CALM people who 'knew less about the endangered plants in the area than I did'. Almost all the negative comments came from the shire of Lake Grace. CALM did receive one rather dubious compliment from a person in Tammin who said, 'I think CALM does a good job despite all the criticism. I think the greens are too extreme.'

11. A comparison of the survey data and agricultural census data

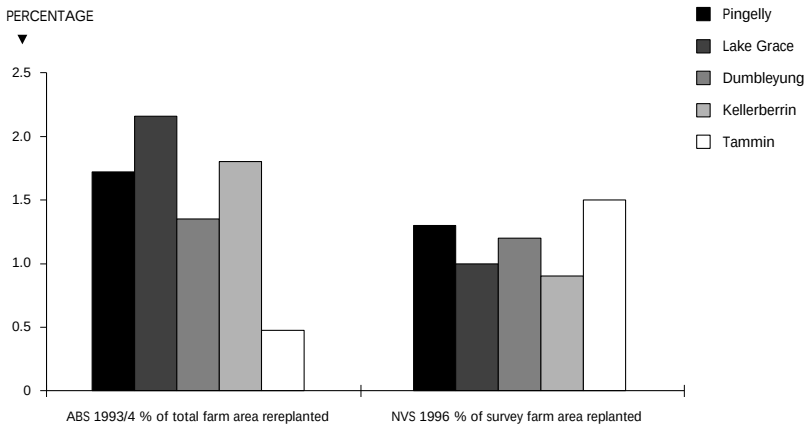
11.1 The agricultural census

The Australian Bureau of Statistics (ABS) conducts an annual survey of all farms. Some of the questions asked in the survey are similar to those in this survey. A comparison is made here of the data from one of corresponding questions in this survey and the 1993–94 survey. Graph 18 contains the percentage of surveyed area in each shire that has been replanted with shrubs and trees. There is a reasonable consistency between the results obtained in the two surveys considering the relatively small sample size in the 1996 survey. Graph 19 contains the percentage of farmers in each of the shires who said that they had replanted some vegetation and had fenced remnant vegetation in the two surveys. There was a relatively large discrepancy between the results obtained in both surveys. The small sample size of the 1996 survey may account for some of the variability but it is likely considering the much greater percentages obtained that they reflect an increase in replanting in the past few years.

Graph 18: Area replanted as a percentage of the total area of farmland surveyed, recorded in the Australian Bureau of Statistics Agricultural Survey 1993–94 (ABS) and Native Vegetation on Farms Survey 1996 (NVS).



Graph 19: Area replanted as a percentage of the total area of farmland surveyed, recorded in the Australian Bureau of Statistics Agricultural Survey 1993–94 (ABS) and Native Vegetation on Farms Survey 1996 (NVS).



12. Conclusions

12.1 The survey

The survey gained a considerable amount of information on various matters regarding native vegetation on farms and landcare as well as on the attitudes of farmers to these issues. The overall trends in the survey are discussed in this chapter as they relate to the original aims.

12.2 Changes in farmers' attitude in the last ten years

To provide a direct measurement of the changes in farmers' attitudes to native vegetation on farms, a the question used by Coates in 1986 (Coates, 1987) was asked again. It contained a series of statements about native vegetation and requested participants to say whether they agreed with the statement or not. (Section 8.1 contains a list of the statements and the responses.) According to the responses of farmers, attitudes had not changed significantly since 1986. The responses to the statements then indicated a high level of awareness of the ecological and land conserving values of bush on farms, and did so again in 1996.

From speaking to the farmers, however, it was clear that there had been big changes in the attitudes of farmers to bushland on farms. Repeatedly people said that they had changed their outlook over the last 5–10 years on a variety of matters pertaining to native vegetation and landcare. They attributed these changes to their greater knowledge of the problems of land degradation caused by overclearing and to the fact that the problems were so extensive and obvious that they prompted them to seek information to address these. The clearest indication of the changes in attitudes to native vegetation can be obtained from the survey data where farmers indicated the actions that they were taking on their farm. In 1986, only 64% of farmers had replanted trees and shrubs on their farm, while in 1996, 84% of farmers had done so. The remainder indicated that they would be doing so in the future. The number of people who chose to plant non-native species decreased by over half. Uses of bushland changed in the last ten years with many fewer (41% compared to 71%) saying that they used their bushland for the grazing or stock. Other destructive and/or devaluing uses of bush such as using it as a site for rubbish disposal or as a source of gravel had decreased by more than half. All farmers recognised that bush required some management to prevent deterioration and that sheep were destructive to bush. The percentage of farmers who had fence bush had increased by almost threefold in three of the shires.

12.3 The effectiveness of funding schemes for landcare work

The survey aimed to discover the effectiveness of funding schemes in prompting landcare work implementation and in changing attitudes. The funding schemes that currently exist are in the form of grants for part of the cost of replanting and fencing of bush, and 100% tax deductions on financial outlay for landcare works.

Only 15% of farmers had received replanting grants and 26% had received fencing grants, compared with 84% who had replanted and 78% who had fenced some or all of their bush. Farmers are obviously very motivated to perform these works and do so in the absence of grants. Of the farmers who received grants, around 60% said that they would have done the work regardless of a grant but they wished to emphasise that they would not have been in a financial position to do it for at least one, possibly a number of years. Better financial assistance for fencing and replanting was listed by over 70% of farmers as desirable to prompt more landcare work. Many said that they had limited time and money to devote to landcare as excessive expenditure would threaten the economic viability of their farm.

Of farmers, 83% said that they thought that the government should provide some sort of financial

assistance for fencing bushland. Of these, 52% were happy to agree to a 30 year contract for the protection of their bush, 11% said they should prefer a negotiable contract that would allow stock shelter and emergency grazing and 13.5% considered contracts a disincentive to obtaining grants at the present time.

Tax deductions of 100% for landcare work were considered inadequate by many people. They said that they were inadequate compensation considering the time spent on the work and the fact that direct tax deductions could be gained from many other commodities on the farm that did not involve uncompensated work. These were chosen preferentially by farmers who wished to offset a large tax bill. It was considered that 150–200% deductions would act as real incentives. Some farmers (6%) said that they would prefer such a tax deduction to a grant for fencing.

12.4 Factors promoting and retarding vegetation management

The most obvious factor which is prompting farmers to manage remnant vegetation is the high level of awareness of farmers of the effects of vegetation in regulating the level of the watertable. In all the shire surveyed, a significant proportion of farmland was salt affected as a result of the rising watertable. The evidence of land degradation is too obvious to ignore and farmers realised the value of keeping healthy remnant bush and its role in local hydrological processes. It is recognised that it is much easier to look after bush that is there rather than to replant it.

The landcare movement is the other major factor that can be identified as promoting management of bush on farms. A number of farmers (64%) were members of catchment groups which aim to manage the vegetation in the area and all remaining farmers were aware of the existence of the landcare movement and its objectives.

The greatest factor retarding bushland management is a lack of available information on: management practices appropriate to different vegetation assemblages; managing areas of bush which are particularly degraded; the role of fire in different bush types; and the presence of rare and endangered species. Many farmers said that they had found it difficult to locate anyone within the government departments who had knowledge on these issues. Of participants, 50% said that they thought that a greater availability of information on bushland management would be an incentive for them to better manage bush. Also, 31% said that they would like a visit from someone with expertise on bushland management to assist them to develop a long-term management plan. Some (36%) said that they did not know whether they had endangered plants or animals in their bush.

Another factor that is retarding the better management of bush in the opinions of many of the farmers surveyed is a lack of commitment on the part of the government to provide financial assistance and personnel for this purpose. It is considered by these individuals that it is because of ill-conceived government policy on clearing in the past that the bushland that remains is in such a poor condition.

12.5 Information on landcare and its perceived value

As already discussed, a paucity of available information on bushland management is impeding better management of bush. This situation extends to all areas of landcare. As well as issues related to bushland management farmers identified the following aspects of landcare work on which they thought information was inadequate or not readily available:

- local hydrology
- suitable species of plants on different soils
- knowledge of the species that could be planted for animal habitat
- plant species that could be planted for animal habitat

BACK TO CONTENTS

- methods of re-establishing an understorey in degraded bushland
- alley farming in particular localities.

12.6 Appraisal of the survey

The survey achieved its original aims as well as obtaining information on a variety of other issues related to native vegetation on farms and landcare. However, after becoming familiar with the responses of the participants to the questions it became obvious that modifications could have been made to the survey form to obtain more informative data. By basing the form on the survey document that was used by Coates in 1986 (Coates, 1987) for the purposes of data comparison, questions were included which may have elicited more informative responses if worded differently. Also, it became apparent as the survey progressed that it would have been valuable to include additional questions on particular issues. For example, farmers were asked whether they had received grants for fencing of remnant bushland. Most had not, but the question prompted many to say that they had spent significant sums of their own money on this. A question on this would have yielded useful results.

13. References

Abensperg-Traun, M., 1995. Nature conservation in the Western Australian Wheatbelt. *J. Dept. of Agric. W.A.* **36**(3):88–93.

Barrett-Lennard, E. G., 1986. Wheat growth on saline waterlogged soils. *J. Dept. of Agric*. W.A. (4th Series) **27**(4):118–119.

Battye, J. S. (ed), 1913. *The Cyclopedia of Western Australia*. Hussey and Gillingham, Adelaide.

Beard, J. S. and Sprenger, B. S., 1984. Vegetation Survey of Western Australia. Occasional Paper 2. Vegmap Publications, Perth.

Bell, R. W., Anson., B. and Loh, I. C., 1988. Groundwater Responses of to Reforestation in the Darling Ranges of W.A. Water Authority of W.A. Report No. WS24.

Breckwoldt, R., 1983. *Wildlife in the Home Paddock. Nature Conservation for Farmers.* Angus and Robertson, North Ryde, Australia.

Bureau of Meteorology, 1993. Western Australia Meteorological Records. Bureau of Meteorology, Perth.

Burvill, G. H., 1956a. Land clearing control in the eastern wheatbelt. *J. Dept. of Agric.* W.A. 5(1):77–79.

Burvill, G. H., 1956b. Salt land survey. *J. Dept. of Agric.* W.A. 5(1):113–119.

Christensen, P. and Maisey, K. G., 1987. The use of fire as a management tool in fauna conservation reserves in Nature Conservation: *The Role of Remnants of Native Vegetation* ed by D. A. Saunders, G. W. Arnold, A. A. Burbidge and A. J. M. Hopkins. Surrey Beatty & Sons Pty. Ltd. Chipping Norton. NSW pp. 323–329.

Coates, A., 1987. Management of Native Vegetation on Farmland in the Wheatbelt of Western Australia. Resource Management Technical Report 145. Department of Agriculture, W.A.

Conacher, A. J., Combes, P. L., Smith, P. A. and McLellan, R. C., 1983a. Evaluation of throughflow interceptors for controlling secondary soil and water salinity in dryland agricultural areas of southwestern Australia: I. Questionnaire surveys. *Applied Geography* **3**:29–44.

Conacher, A. J., Neville, S. D. and King, P. D. 1983b. Evaluation of throughflow interceptors for controlling secondary soil and water salinity in dryland agricultural areas of southwestern Australia: II. Questionnaire surveys. *Applied Geography* **3**:115–132.

Engel, R., 1988. Controlling Saltland with Trees. Farmnote 46/88. Department of Agriculture, W.A.

Engel, R. and Negus, T., 1988 Controlling Saltland with Trees. Agdex 331/570 No. 46/88

Friend, J., 1987. Local decline, extinction and recovery : Relevance to mammal populations. pp. 53–64 **in** *Nature Conservation: The Role of Remnants of Native Vegetation* ed by D. A. Saunders, G. W. Arnold, A. A. Burbidge and A. J. M. Hopkins. Surrey Beaton & Sons Pty. Ltd. Chipping Norton. NSW

George, R. 1990. The 1989 salt land survey. *J. of Agric. W.A.* **31**(4):85–104

George, R. J., 1991. Management of sand plain seeps in the wheat-belt of W.A. Agric. *Water Management* **19**(2):85–104.

George, R., McFarlane, D. and Speed, R., 1996. Degradation of the Remnant Vegetation. *J. Dept. of Agric. W.A.* 37(1):3–9.

Ghassemi, F., Jakeman, A. J. and Nix, H. A., 1995. Salinisation of Land and Water Resources. *Human Causes, Extent, Management, & Case Studies.* University of New South Wales Press Ltd., Sydney.

Greenwood, E. A. N. and Beresford, J. D., 1971. Evaporation from vegetation in landscape developing secondary salinity using the ventilated chamber technique. I. Comparative evaporation rates from juvenile eucalypts above saline groundwater seeps. *J. Hydrology* **42**:369–382.

Henschke, C. J., 1989. Review of WISALTS Bank Installations. Division of Resource Management Technical Report 62. Western Australia Department of Agriculture, South Perth.

Hobbs, R., 1992. Reintegrating Fragmented Landscapes – A Proposed Framework for the Western Australian Wheatbelt. pp. 9–11 **in** *Proceedings of the 5th Australian Soil Conservation Conference Volume 6. Vegetation Retention and Replacement.* ed by G. J. Hamilton, K. M. Howes and R. Attwater. Department of Agriculture, W. A.

Hobbs, R. and Wallace, K., 1991. Remnant vegetation on farms is a valuable resource. *J. of Agric. W.A.* 32(2):43–45.

Holmes, J. W., 1979. The Whittington interceptor drain trial: Report to the Public Works Department, Western Australia. (Unpublished.) School of Earth Sciences, The Flinders University of South Australia.

Hookey, G. R. Loh, I. C. and Bartle, J. R., 1987. Water Use of Trees and Other Vegetation in the Management of Seepage from Eastern Channels in the Wimmera-Mallee Region. Progress Report of the Rural Water Commission, Victoria.

Hussey, B. J. M and Wallace, K. J., 1993. *Managing Your Bushland. A Guide for Western Australian Landowners.* W. A. Department of Conservation and Land Management, Como, Perth.

Jarvis, N. (ed), 1986. *Atlas of Human Endeavour.* Department of Lands and Surveys. Perth.

Klemm, T. 1983. *A History of Dumbleyung.* Advance Press, Ashfield, W.A.

Lefroy, T., Bicknell, D., Hobbs, R., Scheltema, M. and Bartle, J., 1992. Toward a Revegetation Strategy for the Western Australian Wheatbelt. in Catchments of Green. Proceedings of the National Conference on Vegetation and Water Management. Volume A. Greening Australia, Canberra.

Lefroy, T. and Scott, P., 1994. Alley Farming. New Vision for Western Australian Farmland. *J. Dept. of Agric. W.A.* 35(4):119–126.

Main, A. R., 1987. Management of Remnants of Native Vegetation – A Review of the Problems and the Development of an Approach with Reference to the Wheatbelt of Western Australia. pp. 1–13 **in** *Nature Conservation: The Role of Remnants of Native Vegetation* ed by D. A. Saunders, G. W. Arnold, A. A. Burbidge and A. J. M. Hopkins. Surrey Beaton & Sons Pty. Ltd. Chipping Norton. NSW

McArthur, W. M., 1991. Reference soils of south-western Australia. Department of Agriculture, W.A.

Newbey, K. R., 1983. Principles of land use planning. pp. 45–51 **in** *Land Release in Western Australia – Policies Practices and Politics,* ed by E. H. Laoso. Australian Institute of Agricultural Science, South Perth.

Roberts, B., 1992. *Landcare Manual.* New South Wales University Press.

Saunders, D. and Hobbs, R., 1989. *New Scientist* **1649**:63–68.

Schofield, N. J., Loh, I. C., Scott, P. R., Bartle, J. R., Riston., P., Bell., R. W. Borg, H., Anson, B. and Moore, R. 1989. Vegetation Strategies to Reduce Stream Salinities of Water Resource Catchments in South-West Western Australia. Leederville: Water Authority of W.A.. Water Resource Directorate Report No. WS33.

Schofield, N. J., Ruprecht, J. K. and Loh, I. C., 1988. The Impact of Agricultural Development on the Salinity of Surface Water Resources of South-West Western Australia. Leederville: Water Authority of W.A.. Water Resource Directorate Report No. WS27.

Smith, S. T., 1962. Some Aspects of Soil Salinity in Western Australia. Masters Thesis. Agricultural Science Department, University of Western Australia.

Soil and Land Conservation Council, 1992a. Decade of Landcare Plan, Western Australia. An Action Plan for Sustainable Use of Agricultural and Pastoral Lands. Soil and Land Conservation Council of Western Australia. South Perth.

Soil and Land Conservation Council, 1992b. An Evaluation of the Remnant Protection Scheme 1988–1991. A Report of the Soil and Land Conservation Council of Western Australia. South Perth.

Soil and Land Conservation Council, 1995. Annual Report 1994–95. Soil and Land Conservation Council Western Australia, South Perth.

Sonagan, R. M. C. and Patto, P. M., 1985. The Use of Trees and Other Vegetation in the Movement of Seepage from Eastern Channels in the Wimmera-Mallee Region. Progress Report of the Rural Water Commission, Victoria.

Specht, R. L., 1981. Conservation: Australian Heathlands. pp. 235–240 **in** *Heathlands and Related Shrublands: Ecosystems of the World.* Volume 9B ed by R. L. Specht. Elsevier Scientific Publishing Company, Amsterdam.

Wallace, K. J. and Moore, S. A., 1987. Management of remnant bushland for nature conservation in agricultural areas of south-western Australia – operational and planning perspectives. pp. 259–268 **in** *Nature Conservation: The Role of Remnants of Native Vegetation* ed by D. A. Saunders, G. W. Arnold, A. A. Burbidge and A. J. M. Hopkins. Surrey Beaton & Sons Pty. Ltd. Chipping Norton. NSW

Wheatbelt Development Commission, 1996. Lake Grace Community Profile. Wheatbelt Development Commission, Western Australia.

Wilson, A. 1995. Land Conservation Districts. Unpublished.

Wood, W. E., 1924. Increase in salt in soil and streams following the destruction of the native vegetation. *J. and Proc. Royal Soc. W.A.* 10:35–47

BACK TO CONTENTS

Appendix A Farmers' comments

Farmers' comments

This section contains the responses given to Question 53 of the survey:

"Are there any comments you would like to make about anything relevant to native vegetation on farms, land conservation issues, the government departments that provide information on native vegetation and replanting, or anything else you feel may be relevant."

The responses are presented as they were written although in some instances one or two words were added for easier reading or for clarity.

Many of the comments were critical or 'negative'. It should be noted that the relative absence of positive statements does not indicate that such views did not exist, rather that the farmers perceived the section as an opportunity to comment on issues which they felt needed attention by the government.

Land degradation

- Farmers are aware of the problems and endeavouring to do something about them. (Dumb.)
- Enormity of the problem! Enormity of the costs involved! It's daunting; we need all the help we can get. (Dumb.)
- Need some form of enforcement of people in the top end of catchments to join catchment groups as they often don't have a bad problem so don't bother participating. (Dumb.)

Conservation issues

- Some conservation rules are impractical for running of farms eg. bush breeds eagles which take our lambs. (Kell.)
- Reassuring to see direction farmers and government bodies are taking in order to rectify the problems that are gaining more prominence. (Kell.)

Fauna and flora

- Need more biological surveys of the wheatbelt patches of bush so that farmers can revegetate to what's there. At present there's too much broadscale advice from nursery people who do not necessarily have knowledge of local habitat and vegetation. (Dumb.)
- There's a scarcity of books and information about plants and animals of the wheatbelt. Needs to be more so that farmers appreciate the beauty and richness of the area. (Dumb.)

Remnant vegetation

- Native vegetation must be protected from livestock which are eating the understorey out and ringbarking the trees. (Dumb.)
- Native vegetation must not be allowed to become water logged above its natural state (ie. its state prior to the clearing of bush on the upper slopes.) (Dumb.)
- All remnant vegetation should be fenced and managed on all properties under a grant scheme. Incentives should be in place for replanting of natural vegetation or salt tolerant vegetation where necessary. (L.G.)
- At some time, all remaining vegetation will have to be regenerated as it's declining from age. Whether this should be regeneration of native species by refencing, or introduced species should be the decision of the farmer concerned. Water course regeneration should be encouraged by fencing along both sides and controlling grazing. 0(Ping.)

- Under the present scheme often there is not enough financial incentive especially in tight financial times to encourage farmers to set aside these areas. (Tamm.)

Research

- More research needed for future commercial use of 'bush'.

Clearing

- I left bush on my property for years and told the Ag. Dept. my long term slow clearing plans which were approved by them. However, now I can't clear due to new government regulations so effectively I've been penalised for originally doing the right thing by the land. (Dumb.)
- I have 60% bush left on my property and am unable to clear it because the shire has under 20% left. This is most unfair as I have been penalised for others overclearing and no form of compensation has been offered. (Dumb.)
- Should be more incentives for leaving the bush there. eg. money for bush which you now can't clear to get income from. (Dumb.)
- Wanton destruction of bush still goes on all the time such as for the replacement of boundary fences and the destruction of small areas, of less than one hectare, to increase the productive area of land. (Dumb.)
- Need better enforcement of clearing laws. (L.G.)
- I think too many trees have been cut down. (Tamm.)
- Years ago the bank lent a percentage of a Statutory Reserve Fund for farm development to encourage clearing. Today we should reverse the situation to protect bushland with the same Commonwealth involvement. (L.G.)
- The country that we're farming should never have been knocked down in the first place. We need to put the trees back now to lower the watertable. (Tamm.)
- Farmers in the lowlands have the greatest salt problems because of highland clearing. They should be compensated. At present they are bearing the burdens of the government's early clearing policies. (L.G.)

Replanting

- There is huge resistance to planting trees for salt land rehabilitation versus drainage and pumping of salt water. Also people don't like planting mallees, they want a 'decent sized' tree! (Dumb.)
- Need local demonstrations of windbreak efficiency. (Dumb.)
- Need range of trees and shrubs which are commercially useful. (Dumb.)
- Need more research into deep rooted fodder (lucerne etc.) (Dumb.)
- We have embarked on tree planting exercise but have been restricted by finance, as well as lack of local knowledge of the best species. (L.G.)
- We have started to plant trees and fence bush off in this shire but it's going to take a lot more to get the district back to a relatively salt free zone. (Dumb.)
- After 20 years tree planting experience I've found that non-local species die after about 10 years when their roots reach salt. I now plant only local natives which grow well. (Kell.)
- Need more replanting grants. (Kell.)
- Need more evidence that planting trees and taking land out of production is going to make your income better in the long-term. It's easy for people from the government departments to tell you these things, but they're not the ones relying on the income from the property. There's a limit to the

amount of land that can be taken out of production. (Kell.)

- There needs to be continued education and encouragement for replanting and to quantify economic benefits where they exist and to highlight non-economic benefits. (Tamm.)
- Not enough advice available on appropriate plant species for local areas. eg. No-one can tell me how to start an appropriate understorey. (Tamm.)
- I think the trees used in Ribbons of Green could be planted in more suitable areas. (Tamm.)
- There should be more replanting grants for the areas that shouldn't have been cleared. (Tamm.)
- I think there should be greater practical involvement of voluntary groups in tree planting. (Tamm.)

No-till

- There needs to be money made available in the form of subsidies for no-tillage machinery. Also the Landcare Officers should be educated to let farmers know the benefits of no-till. After using this method I'm convinced that the widespread use of this method would be as valuable or more valuable than tree planting. It improves soil structure and water holding capacity and prevents soil erosion. (Dumb.)
- The cost of minimum till/no till equipment is enormous. Subsidies would be helpful. (Dumb.)

Sheep

- A subsidised option to take sheep from properties to allow natural vegetation to recover. Hence there would be no need to fence native vegetation. (L.G.)

Feral animal control

- Need rabbit control so we can save trees planted. (Ping.)
- Need assistance in fox baiting. (Ping.)

Landcare

- Would like to see more landcare money at grass roots level and not in administration. (L.G.)
- I'd like to see all money for landcare get to where the problem is rather that be gobbled up by administration. (L.G.)
- Get more of the landcare fund onto the ground to show more results. (L.G.)
- Landcare money has been spent on infrastructure and personnel, nothing significant has happened on the land. landcare equals 'Jobscare' as far as I'm concerned. (L.G.)
- Landcare meetings are only conducted during the day, the productive time for farmers when the Landcare people are getting paid. (L.G.)
- Rather than spending money on the theoretical side of landcare (which has already largely been done) money should be directed to 'on the ground' projects eg. fencing, contour banks. (L.G.)
- There is a tendency in the Lake Grace area for Landcare Coordinators to be based with the Ag. Dept. rather than distributed throughout the area where they'd generate more local interest. (L.G.)
- Present funding of landcare is not achieving results on the ground to stabilise the land degradation problem. (L.G.)
- Landcare officers don't arrive fully trained. Over the first 6–8 months they're off doing courses etc. They do not seem to have a thorough understanding of farm operations. (L.G.)
- Need more of the government fund getting on the ground and not in administration. (L.G.)

- Perhaps each shire could compile information on the amount of landcare work done and money spent and grants received and distribute the information. Landcare activities over time could be monitored in this way. (L.G.)
- LCDC's in most cases have been a waste of money. Simply providing another statistic of less employed. Trees have been the most significant achievement whilst the main problem of moving water off affected land has been ignored because of lack of practical experience. All this does is restrict people who want to at least try something and learn because there are not any figures to support the idea of drains. I believe that this concept needs government assistance in as much as it would be a learning curve in respect to addressing the salinity problem we are faced with. (L.G.)
- Farmers shouldn't have to have approval by landcare for all soil conservation and drainage works. There's a number of methods around and different methods might be appropriate in different situations. Landcare/Ag. Dept. would be better acting as consultants rather than as dictators. (L.G.)
- By using only a single approach (ie. by Landcare) you will lose the benefits of novel and innovative methods and also of getting farmers disgruntled by telling them what has to be done on their own land. (L.G.)
- Money for landcare does not seem to get to the actual farm lands. (Kell.)
- Not enough of the money gets to the farm, most goes in employment and administration. (Kell.)
- Wages for employee visits could be better spent to supplying trees. (Kell.)
- Landcare money is not getting to the ground. (Tamm.)

Landcare implementation

- Need better overall catchment plans to get things done. Very little that's recommended is being done. (L.G.)
- Land conservation measure need to be fast tracked. Could be achieved by: better education; more information; free trees. (Kell.)
- Needs to be greater understanding amongst farmers of ecological aspects, such as total system management. (Kell.)
- Need some sort of coordination of overall plan eg. State Soil Conservation Minister. (Kell.)

Community involvement

- Encourage children through involvement with planting etc. (Ping.)
- Organise a local voluntary tree planting group. (Ping.)

Women

- Need greater focus on women in landcare.

Farm plans

- Formal farm plans don't necessarily mean good farm management or revegetation management. (Kell.)

Farmers

- No other members of society in general or the landcare people etc. put in as much time and money as the farmers do for landcare. (L.G.)
- There is a lack of money. Farmers would show more interest if they could afford to. (L.G.)
- Those people on the higher country don't show much interest in doing much so the farmers on lower ground which are getting poorer because of salt encroachment have to foot all the work. (L.G.)
- I'm on top of the catchment and have done and payed for own replanting and fencing,

etc. so I have the control over management decisions. In lower lying areas where problems are greater I agree there should be as much help as possible. We're lucky we haven't got bad problems. (Ping.)

- Landcare groups are good but a lot of farmers are waiting for money for trees and aren't getting on with it. There'll never be enough money for all the trees that need planting. (Kell.)

Whittington's/WHISALTS interceptor banks

- WHISALT banks have created more problems than they've solved. (Kell.)
- Politics and lack of understanding is preventing the study and implementation of correct conservation practices including earthworks for the redirection of water. The movement of water through the topsoil is changing the natural aerobic/anaerobic balance of the soil. Movement of water from hill creates an aerobic soil state which prevents plant/ pasture growth. Perched watertable in valley floors create and anaerobic soil state which also prevents plant growth . Due to this water movement, soil chemistry changes which causes a change in soil structure. Therefore, we must go back to basics and control water movement. (Tamm.)
- Started planting trees in low areas 35 years ago. The trees died, they dried out. The salt problem wasn't solved. I then tried Ag. Dept. contour drains which didn't work, no effect at all. I then put in one Whittington Interceptor Bank above the salt patch and it's become smaller. From my experience dealing with Ag. Dept. people they're refusing to acknowledge the success of this method. (Ping.)

Costs

- Our farm would spend $50,000 dollars per year on conservation measures and it doesn't seem to end! (Dumb.)

Source of finance for landcare work

- A food tax would pay for the ecological damage involved in all food production and could be directed out developing sustainable agricultural methods. (Dumb.)

Fencing grants

- I think farmers should pay for their own fencing of bush rather than the government. Those that get the grants are often well enough off any way. The farmers who have the grants in this area are the rich ones. (Dumb.)
- It seems that some people are directing all resources their way and others are missing out. (Kell.
- It seems that smaller landholders miss out when funds for fencing are allocated. (Dumb.)
- The grants seem to go to the people who make all the noise. Genuine farmers do the work anyway without the grants, on their own initiative. (L.G.)
- Overall concept should be observed as against small local self interested groups. Often money is going to vocal groups in areas that are not necessarily the most in need. For this reason we have chosen to do our own thing. (Kell.)
- Should be more grants available for fencing small areas as these are the most vulnerable to degradation from sheep grazing. (Dumb.)
- Don't think that grants are necessary for fencing as people will do it anyway if they want to. Money spent on grants would be better spent on research to find out the real way of combating salt. (Dumb.)
- Would like to see money available to fence salt land that does not have tree and vegetation growing on it so that young trees can be planted and revegetated at an ongoing rate. (L.G.)

- Salt land revegetation needs to be looked at under the same scheme as the Remnant Vegetation Protection Scheme. To be able to fence off salt land with enough fertile land around it to replant to help protect the whole area. (L.G.)
- If money is available for reclaiming salt land eg. trees and fencing, it should be more accessible. (L.G.)
- Farmers should pay all the cost of fencing around their property without grants. Some grants are not allocated in the right way. (L.G.)
- Grant system is cumbersome and ineffective. (L.G.)
- Currently you don't hear why you've been rejected for grants so you get discourage from applying. (Kell.)
- Feel grants are better than tax incentives as in some years tax concession aren't and incentive as you are not paying sufficient tax, and in years of low income, it's when you most need grants. (Tamm.)
- Information on grants is hard to get and application forms are time consuming and difficult. Perhaps money should be distribute through the catchment groups. That way planting can be coordinated between group members. (Tamm.)
- Too much money is spent on administration and bureaucracy, not enough landcare money is getting onto the ground. Too much of my time has been wasted on grant application procedures with no result. (Tamm.)
- Would like to see more incentives to conserve land and native flora and fauna and information on benefits of this rather than large bureaucratic organisations administering grants to farmers. (Ping.)
- Wipe grant scheme and supply trees free and the labour to assist with planting (for instance the unemployed). Under present system a few people in each shire get a large percentage of grants. This would be a fairer system. (Ping.)
- Grants take too long to process, not enough money gets onto the ground. Administration takes too much and too much spend on adds, public relations etc. to convince city people that lots has been done, to get the green vote. (Tamm.)

Contracts and fencing grants

- I object to the inclusion of contracts in the fencing grant schemes because they prevent you from using it for example for things like seed collecting, wildflowers etc., all thing that might provide some sort of income in years to come.
- The governments contract system on remnants means that the government is getting 'nature conservation reserves' without paying and getting the farmer to foot the cost. As well he still has to pay rates. (Dumb.)
- Disagree with contracts on bush as need to keep options open on future use, eg. ecotourism, firewood, medicinal plants. (Kell.)
- Small amounts which can be applied for ie. $600 km, does not balance with a 30 year caveat or management clause. (L.G.)

Fencing grant application procedures

- Too much of my time has been wasted on grant application procedures with no result. (Tamm.)
- Simplify the grant applications and set broader criteria to qualify for these grants. (L.G.)
- Expectations for standards of grant applications are unreasonable. The average farmers applications may not be as literate or academic as expected by the department concerned. (L.G.)

- There is far to much red tape. Simplify all forms of cash grants, if that's the way the government want to go, or else, 150% or 200% tax deductions on expenses on these issues. (Dumb.)
- Need to be more information available on grants and replanting. At present there are too many different people to go through to get it. Maybe it should be distributed through shire offices. (Kell.)
- Grant application procedures should be more simple. A government person should inspect first before the decision is made. (Kell.)
- More straightforward grant application forms needed. (Kell.)
- Less complicated forms to fill out for grants. (Kell.)
- Grant application forms require procedures to measure areas. Need information on how to go about it. (Kell.)
- Grant applications are too complicated. Lots of trees are lost in the paperwork. (Kell.)
- Application procedures too complex but if they were easier perhaps there'd be unwarranted applicants. (Kell.)
- Grant application – very cumbersome. Lot of work for often very little reward. Some grants especially State Landcare are becoming very difficult to obtain for on ground, basic conservation work. Too much of my time has been wasted on grant application procedures with no result. (Tamm.)
- Grant applications are too complicated, need to be simpler. (Tamm.)
- Cut out all the red tape and make it much simpler and straightforward to get a grant. Farmers all agree there is a problem and want to improve it but at the end of the day there's only so much money to spread around. (Tamm.)
- Refused grants three times. Consider application forms to be too hard for average farmers to fill in and should be more simple. Also, a representative to come to farm to inspect sites and help with application. Have spent $12,000 of my own money (on fencing and replanting). I should be qualified to make these statements. (Tamm.)

Labour and financial support

- If the government wish to direct farmers to revegetate areas they should fund their ideas 100% and give good tax incentives to farmers who wish to do conservation areas from their personal finances. (Tamm.)
- Should be able to get more financial support for fencing and replanting. (Dumb.)
- Need some help with the cost and labour for fencing and tree planting. (Dumb.)
- Government should provide money for labour so the whole job of fencing and replanting can be done in one go. (Dumb.)
- Would like to see programs which provide free trees and the cost of planting etc. (L.G.)
- Government should provide 50% of the cost of replanting native vegetation. The farmer to provide the other 50%. (L.G.)
- Tree seedlings should be provided free. (L.G.)
- As a thought – People on the dole should be approached to plant trees, so many for a group per year. (L.G.)
- Give farmers more access to finance for assisting with revegetation. (L.G.)
- Need grants to fence salt lands and plant trees or tax incentives to do the same. (L.G.)
- If there were cheap loans for drains etc., more would get done. (L.G.)
- Overall, I still think labour to implement all these ideas, particularly fencing, is the biggest issue and one our shortest asset. There seems to be volunteers to plant trees but not too

many to erect fencing and maintain it. I hope you get the MESSAGE!

- Should be rates and tax reductions to those who revegetate or have considerable amounts of bush in good condition. (Dumb.)
- It is all there available but there's just a lack of finance. (Kell.)
- Being held back on landcare by finance. (Kell.)
- There needs to be financial and physical (labour) assistance to perform the work. Labour at present costs $120 plus per day. (Tamm.)
- Needs to be more assistance for fencing. (Tamm.)
- Would like more community support for landcare. There's a lot of money available, but needs to be lots more to stop spread of salt. (Tamm.)
- Federal grants for native vegetation also tax incentives of 150% for land conservation to control salt. (Ping.)
- Need better financial support for fencing off native vegetation and land conservation. (Tamm.)

Tax incentives

- Delete all grant systems and convert to tax incentives eg. 200%. Too much money is wasted on administration. Too little of government funding gets to spent on conservation works on the ground. (Dumb.)
- I feel that tax concessions are preferable to grants for landcare. If farming was more profitable more would get done. Money is the thing that's stopped us from fencing bush. (L.G.)
- Real tax incentives give farmers greater opportunity to invest in landcare as the need and desire to do so is great. The current system cannot keep pace with the time frame required to achieve results. (L.G.)
- Would like to see tax relief of 150% for all revegetation and fencing of salt or waterlogged areas. (L.G.)
- If greater tax incentive was given, ie. 150–200%, more landcare work would be done. (L.G.)
- Conditional Purchase land had a contract to clear a designated amount of land per year or forfeit the land. A 150% tax deduction was the carrot to keep people clearing. Now we should have the same tax scheme in place to revegetate an area 20% the size we cleared. A small price for society to pay for a national problem, not just the farmers!!! (L.G.)
- I think a tax incentive would encourage more revegetation. (L.G.)
- Need 150% tax incentives/deduction to get landcare work done. (L.G.)
- Greater tax benefits required. (L.G.)
- Tax incentives would be better than grants as they tend to cost too much to administer. (L.G.)
- Bigger tax saving incentives would result in a lot more ground work. (L.G.)
- If there was a tax incentive people would do fencing and replanting. At the moment there's not enough money to do much. (L.G.)
- Should be tax incentives rather than grants to ensure equal distribution of money and make sure work gets done. (Kell.)
- Tax incentives eg. 200% tax deduction for establishment costs of native vegetation. (Ping.)
- There should be 200% tax incentives for trees and landcare work. (Tamm.)
- 200% tax deduction on all landcare projects (Ping.)
- Need a 200% tax deduction for fencing and replanting saline country. I have spent $10,000 on fencing off bush areas in the last 7 years. (Tamm.)

- There should be a tax deduction of over 150% but not above 200% for fencing and replanting (including labour and materials) of native vegetation and any of the planting in general. The reason I feel this is that the world is rapidly becoming denuded and an incentive like 120% taxation deduction would almost overnight result in a huge tree planting in all of agricultural Australia. (Tamm.)

Compensation for leaving the bush

- Should be shire rate relief. ie. Exempt for whole cost of bush. (Dumb.)
- Need to pay farmer an income for land left as native vegetation as it can't be used for income from crops. (Dumb.)
- It is not possible to generate a per hectare income from native bushland equivalent to cleared land, but it carries the cost of preservation and shire rates. Its value is a perceived value which does not accrue to the farmer who owns it. There is a community benefit and the community must be prepared to compensate the landholder. (L.G.)
- Compensation exists through the valuer general assessing the land for rock and salt, but none for remnant bushland. This should be done. Where a farm has to retain 15% or more of native vegetation to protect the catchment, they should be compensated for the land left as it benefits everyone. (L.G.)
- There should be no rates for bush. (Tamm.)

Shires

- The shires should do more to replant bare areas rather than just leaving them. (Dumb.)
- To avoid knocking down large trees along roads when they're being widened there should be incentives to farmers to allow the road to be built inside the their boundary. Then the old road could be revegetated forming a wide strip of bush. (Dumb.)
- Local shires should own tree planters which they lend or lease out. (L.G.)
- Protect bushland areas from local shires taking gravel. The shire is after gravel on my property which would mean knocking down a beautiful stand of old 'blackboys'. Main roads also have this attitude that large amounts of gravel can be taken leaving great ugly scars. (Ping.)
- There should be better coordination between shire tree planters and Main Roads Dept. Main Roads has just removed trees that were planted. (Tamm.)

Government departments

- Money now spent on white cars and consultants should be spent on trees (Apologies to the consultant for this remark, but its true.)
- Government departments have too little real experience (ie. hands on) and make decisions without full knowledge. Also won't take seriously what the farmers say and know in local areas. Local knowledge is more valuable that some computer model. (Dumb.)
- In the 1960's we wrote to the Premier pointing out the error of opening up any more land in this area due to the increasing salinity problem. Our letter was forwarded to the Minister for Agriculture and Ag. Dept. but fell on deaf ears. They continued to open land. Consequently the salinity problem that we have today. (L.G.)
- Government should take back salt affected land with farmers permission and compensation and manage revegetation. (Kell.)
- Let the person who owns the land freehold, do whatever he or she wants to do with it without outsiders trying to run the show. (Tamm.)

Agriculture Western Australia

- Information from the Ag. Dept. is sometimes not relevant or not always totally right or practical. Phoning the Dept. doesn't usually get results. The people there are often reluctant to commit themselves to a particular course of action. Agronomists at chemical companies are often a very good source of information. (Dumb.)
- Ag. Dept. inefficient in processing application for clearing. Has taken 4 years and no answer. (Dumb.)
- The Ag. Dept. could bloody disappear and none of us would even notice or be any worse off. I'm sick of them doing research and telling me about things I already Know. (L.G.)
- Ag. Dept. needs to so more research into effective methods of salt control. No-one can tell you how to stop salt at present. Perhaps the Ag. Dept. could buy farms at the top of catchments and use them as models. (Kell.)
- More free advice on replanting from a government body eg. the Ag. Dept. would encourage more replanting, along with tax incentives. (L.G.)
- Hard to track down people with enough knowledge within the Ag. Dept. and elsewhere, to do with conservation work, watertable etc. (L.G.)

CSIRO

- CSIRO research findings should be more accessible to farmers. (Kell.)

CALM

- Narrogin CALM has not responded to a query on trees with a high eucalyptus oil content. Query was in May 1995. So far no reply by 28/2/96. (L.G.)
- Consider CALM should put in better fire breaks on all reserves. (L.G.)
- Currently, the reserve adjacent to my farm is not burnt. There needs to be a burning program so when it burns, as it eventually will, it is no out of control. (L.G.)
- I would like to see CALM controlling the bush on their side of the boundary fence. Farmers keep their side clean. (L.G.)
- Control CALM – too rigid in their ways! (L.G.)
- We think that most of the land management should be left to the people who know most about the land and have to live, work, sleep and breathe land, THE FARMERS! The land is dear to their hearts and they make the best decisions. CALM etc. should have little or no input into things they do not understand. (L.G.)
- Haven't got much faith in so-called experts from government departments. Have had CALM people here who knew less about the endangered plants in the area than I did. (Kell.)
- CALM should do something to control feral animals in reserves. (Tamm.)
- Fencing costs on boundary lines with government departments should be shared. Firebreaks should be compulsory. eg CALM land adjoining farms. At present CALM doesn't have to put in firebreaks.
- I think CALM does a good job despite all the criticism. I think the 'greens' are too extreme. (Tamm.)

Appendix B Letter of notification

NATIVE VEGETATION ON FARMS SURVEY 1996

Sue Jenkins
C/- Spatial Resources
Agriculture W.A.
Baron-Hay Crt
South Perth, 6151
Ph. 09 368 3819
FAX 09 368 3946

Dear Landholder,

In 1986, a survey was conducted to find out how farmers viewed native vegetation on their properties, and to obtain their opinions on incentive schemes designed to help them maintain bushland on their properties. This survey is now being repeated to obtain "up to date" information and I am hoping you will participate. I have been appointed as an independent consultant to carry out the survey, in association with the Department of Agriculture, the Department of Conservation and Land Management and CSIRO.

Your name has been randomly selected to form part of a sample of farmers in your shire. Five shires are included in the study, Tammin, Pingelly, Dumbleyung, Lake Grace and Kellerberrin. The 1986 study included only the first four shires, however, this time Kellerberrin has been added at the request of researchers at the Wildlife and Ecology Section of CSIRO, who feel that the findings of the survey will complement their work in the Shire.

I appreciate that as a farmer you are likely to have very limited free time, however, I am hoping you will spare me around one hour to fill-in the survey. As part of a small sample, your opinion is very important. Any information given to me during the survey will be treated as confidential and only Shire totals will be reported.

I will be visiting farms personally in February, March and April. I will ring you in the next few weeks to make an appointment that is convenient to you. Please do not hesitate to contact me on the telephone or fax numbers listed above if you wish to obtain more information.

Yours sincerely,

Sue Jenkins

Appendix C Survey form

National vegetation on farms survey 1996

This survey is to find out how you, the landholder, view native vegetation on farmland and also how you feel about various incentives which are designed to help you maintain areas of natural bushland on your property. The term 'native vegetation' is used to mean natural bushland. It does not include species such as pines, Blue Gums, etc. The term remnant is used to mean a patch of remaining bush.

A similar survey was carried out in 1986. If you took part in the 1986 survey, could you place a tick in the following box. If you did not, could you leave the box empty.

To fill in the survey:

Some questions require written responses, some the circling of a number which corresponds to the statement with which you agree, some of the placement of a tick in a box and the remainder, the filling of a number in a box which corresponds to a listed comment. In each question the required response will be stated or the question will be in the same format as questions that you have already answered.

Please answer all the questions.

Section A

This section contains information about you and your property.

1. In which shire is your property? Please circle the number next to the appropriate answer.

   1 Dumbleyung

   2 Lake Grace

   3 Kellerberrin

   4 Pingelly

   5 Tammin

2. What type of farm do you manage?

   1 Cropping

   2 Cropping/Sheep

   3 Cropping/Sheep/Cattle

   4 Sheep/Cattle

   5 Other – Please specify . . . . . .

3. What is your age?

   1 Under 21

   2 21–30

   3 31–40

   4 41–50

   5 51–60

   6 More than 60 years

4. What is your highest level of formal education that you have attained?

1 Primary School

2 Secondary School, years 8, 9 or 10

3 Secondary School, years 11, or 12

4 Technical College

5 Agricultural College

6 University

7 Courses relating to farming

8 Other – Please specify . . . . . .

5. How long have you owned/operated the oldest part of your present property?

1 Under 2 years

2 2–5 years

3 6–10 years

4 11–20 years

5 21–30 years

6 31–40 years

7 More than 40 years

6i. Was this farm run by your family before you?

1 Yes

3 No

6ii. If the farm was run by your family before you, how many generations including your own have run the farm? (Please do not include your children if they work your farm also.)

. . . . . .generations

Comments . . . . . .

. . . . . .

. . . . . .

7. What percentage of your total income do you earn from your property?

. . . . . .percent

8. Are you a member of any of the following groups or organisations?
You may circle more than one.

1 Land Conservation Group

2 Catchment Group

3 W.A. Farmers Federation

4 Land Management Society

5 Greening Western Australia/Men of Trees

6 Nature Conservation Group (eg. Wildflower Society, Royal Ornithological Society, Naturalist Society)

7 Australian Society for Animal Production

8 Kondinin Society

9 Other – Please specify . . . . . .

9. How long have you been farming?

. . . . . .years

10. How long have you been responsible for major farm management decisions?

. . . . . .years

11i. What is the total area of your property?

. . . . . .ha

11ii. How many hectares are owned by you?

. . . . . .ha

11iii. How many hectares do you lease?

. . . . . .ha

If land is leased, go to question 12 (Q.12), if not miss Q.12, and go to Q.13.

12. Do you make the decisions about clearing and fencing the native vegetation on the land which you lease?

1 Yes

2 No

When answering the following questions, answer only for land for which you make the decisions regarding native vegetation management.

13i. Do you have a Farm Plan for managing your property? This is where you have a map of the farmland a list of actions to be taken over the next few years.

1 Yes

2 No

13ii Who helped you develop this?

1 Department of Agriculture

2 Catchment Co-ordinator

3 National Landcare Project Office

4 Other – Please specify . . . . . .

13iii. Is this part of an overall catchment plan?

1 Yes

2 No

14. Have you attended a farm planning workshop?

1 Yes

2 No

15. If you have a Farm Plan, what aspects of this have you managed to implement? Please fill in a number in each of the boxes which corresponds to one of the following comments:

eg ☐

1. Included in plan but not started yet
2. Started but not completed or ongoing
3. Completed
4. Not applicable

☐ Replanting

☐ Fencing of bushland/replanted areas

☐ Contour banks/Drains

☐ Fencing according to soil types

☐ Soil treatments (eg. lime, gypsum)

☐ Cultivating along contours

☐ Minimum tillage/no tillage/stubble retention

☐ Alley farming

☐ Other? – Please specify . . . . . .

16. How many hectares of your property are affected by the following.

a) Salt (Land too salty to crop) . . . . . .ha

b) Wind erosion (evidenced by bare soil) . . . . . .ha

c) Water erosion (bare soil and gullies) . . . . . .ha

d) Soil acidity . . . . . .ha

e) Non-wetting soils . . . . . .ha

f) Waterlogging . . . . . .ha

g) Any other factor affecting soil stability . . . . . .ha

17. How long ago was the first bush cleared on this property?

1 0–10 years

2 11–20 years

3 21–40 years

4 41–80 years

5 Over 80 years

6 Unsure

18. How many hectares of your property still has native vegetation?
(This includes trees along water courses and along fence lines.)

. . . . . .ha

19. How many hectares of this native vegetation is growing on land which you consider could be suitable for cropping?

. . . . . .ha

20. How many hectares of native vegetation has been cleared on your property over the last ten years?

. . . . . .ha

If vegetation has been cleared in the last ten years, answer questions 21–26, if no vegetation has been cleared in the last ten years miss these and go to Q.27.

21. How is this cleared land being used? You may circle more than one.

1 Pasture

2 Cropping

3 A dam site

4 A fire break

5 Other – Please specify . . . . . .

22. Do you clear a set amount of land every year as part of your farm development plan?

1 Yes

2 No

If the answer to Q.22 is 'No', moss Q.23 and go to Q.24.

23. Is this in keeping with your lease agreement?

1 Yes

2 No

24. Would you have cleared more land is more money had been available?

1 Yes

2 No

25. Did you clear only when economic pressures made it necessary?

1 Yes

2 No

26. Have you had advice which has influenced your land clearing decisions from any of the following sources? Circle more than one if necessary.

1 Dept. of Agriculture

2 CALM

3 CSIRO

4 DOLA

5 Land Conservation District Committee

6 Catchment groups/Community Landcare Technicians

7 Farm Consultant

8 Other farmers

9 Other – Please specify . . . . . .

27i. Have you ever replanted trees and shrubs on this property on areas which had previously been cleared? (This does not include around the house.)

1 Yes

2 No

27ii. If 'Yes', what was the reason, and how many hectares were replanted for each reason? Please circle more than one if applicable and fill in the number of hectares for each reason.

1 Shelter belts/Windbreaks/Alleys . . . . . .ha

2 Revegetation or to combat land degradation/salt . . . . . .ha

3 Timber or wood pulp . . . . . .ha

4 Flower or foliage uses . . . . . .ha

5 Fodder or forage . . . . . .ha

6 Other . . . . . .ha

Please specify . . . . . .

27iii. How many hectares of your replanting is fenced?

. . . . . .ha

28i. What species have you planted? Please circle more than one if applicable

1 Plants non-native to Australia (eg. pines)

2 Local native species from locally collected seed

3 Local native species from seed collected elsewhere

4 Plants native to Australia but no locally native (eg. River Gums)

28ii. What are the main species you have planted

. . . . . .

. . . . . .

29i. Did you get advice on matters concerned with replanting trees and shrubs?

1 Yes

2 No

29ii. If 'Yes', did you get advice from any of these sources? Circle more than one if you need to.

1 Farm Journal/Paper

2 Television

3 Radio

4 Book

5 Local Newspaper

6 State or National Newspaper

7 Farming Organisations

8 Nurseries or contract planters

29iii Did you get advice from any of the following sources? If 'Yes', could you tick the box in the table below that corresponds with the source and nature of the source?

Source	Phone inquiry	Visit of agent	Field day	Seminar	Workshop	Book/booklet
Dept. of Agriculture						
CALM						
CSIRO						
DOLA						
Land Conservation District Committee						
Catchment groups/Community Landcare Technicians						
Farm Consultant						
Other Farmers						
Other						

30. Was the information that you received adequate for your needs?

1 Yes

2 No

Comments . . . . . .

. . . . . .

31i. Have you received any grants to do your replanting?

1 Yes

2 No

31ii. Who were the grants from? How much did you receive? How much of your own money did you add?

Please fill in the table below

Name or organisation who gave the grant	Amount of grant	Amount you added
. . . . .	$	$ . . . . .
. . . . .	$	$ . . . . .
. . . . .	$	$ . . . . .

31ii. Would you have replanted without the grant?

1 Yes

2 No

32. How many hectares of native vegetation on your farm is fenced from stock? This does not include areas of replanting.

. . . . . ha

32i. Have your received any grants to fence native vegetation from stock?

1 Yes

2 No

32ii. Who were the grants from? How much did you receive? How much of your own money did you add?

Please fill in the table below

Name or organisation who gave the grant	Amount of grant	Amount you added
. . . . .	$	$ . . . . .
. . . . .	$	$ . . . . .
. . . . .	$	$ . . . . .

32iii. Would you have fenced the vegetation if grants were not available?

1 Yes

2 No

34. Are there areas of native vegetation on your farm used for:
You may circle more than one.

1 Regular grazing of stock

2 Emergency grazing of stock

3 A source of firewood

4 A source of fence posts

5 A source of gravel

6 A source of honey

7 Rubbish disposal

8 Ecotourism

9 Personal recreation

10 A commercial source of native flowers/seeds

11 Other – Please specify . . . . . .

35i Have you noticed any decline in tree health in your native vegetation?

1 Yes

2 No

35ii If 'Yes' approximately what percentage is affected?

. . . . . .%

What do you think is the cause? . . . . . .

. . . . . .

. . . . . .

Section B

This section seeks your opinion on native vegetation on your property.

36. Following are a number of statements about native vegetation. For each of these, could you indicate the degree of your agreement or disagreement to each by filling in the number of each of the comment listed below which corresponds to how you feel

eg ☐

The comments are:

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly agree
6. Don't know

The statements are:

☐ a) Native vegetation harbours undesirable plants and disease

☐ b) Native vegetation is pleasing to look at

☐ c) Native vegetation is a fire hazard

☐ d) Native vegetation is important to control salinity and erosion

☐ e) Native vegetation is costly to maintain

☐ f) Native vegetation is important for the conservation of native flora and fauna

☐ g) Native vegetation shelters feral animals (foxes, rabbits, cats)

☐ h) Native vegetation adds to my property's value

☐ i) Native vegetation is important for the shade and shelter of stock

☐ j) Native vegetation reduces the productive capacity of my property

☐ k) Maintenance of native vegetation takes too much time

☐ l) Native vegetation is important for farm stability

☐ m) Native vegetation protects rare plants

☐ n) Native vegetation provides corridors for wildlife movement

37. How do you regard native vegetation on farmland in your shire.

1 a) Benefits greatly outweigh any disadvantages

2 b) Benefits outweigh disadvantages

3 c) Benefits about equal disadvantages

4 d) Disadvantages outweigh benefits

5 e) Disadvantages greatly outweigh benefits

38i. Do you think that native bushland requires any management?

1 Yes

2 No

38ii. Which of the following would you be prepared to do to manage the native bushland on your property if you had lots of time and money? Circle as many as needed.

1 a) Fence all bushland to exclude stock

2 b) Control weeds

3 c) Control feral animals (eg. foxes, rabbits)

4 d) Manage kangaroo numbers

5 e) Replant or direct seed to thicken up degraded areas

6 f) Use fire to encourage regeneration

7 g) Plant a strip of buffer vegetation around the remnant

8 h) Plant vegetation corridors to connect remnants to allow wildlife movement between them

9 i) Leave or create special fauna habitat sites (eg. bird nestling hollows/boxes, hollow log for lizards)

10 j) Replant or manage areas elsewhere in the catchment to protect the remnant from degradation (eg. from salinity)

11 Preserve wetlands

12 Take care using pesticides and herbicides near wildlife habitat

39. From which of the following agencies would you seek management advice for your bushland?

1 Dept. of Agriculture

2 CALM

3 CSIRO

4 DOLA

5 Land Conservation District Committee

6 Catchment groups/Community Landcare Technicians

7 Farm Consultant

8 Other Farmers

9 Other – Please specify . . . . . .

40i. With your current knowledge and experience, if you were to clear your farm from intact bushland today, what percentage of the property would you leave in an uncleared state?

. . . . . .%

40ii. What type of areas would you leave as bushland? Please specify.

. . . . . .

. . . . . .

. . . . . .

41. Let us assume every hectare is suitable for cropping or grazing, and you were starting to clear from the beginning. What percentage would you leave in a natural state?

. . . . . .%

42. If there is native vegetation on your property, please indicate the reasons why you have retained it, against the statements below. Please fill in the number which corresponds to the following comments to indicate the priority you gave to that reason.

. . . . . .%

The comments are:

1. Main reason

2. Secondary reason/s

The statements are:

- ☐ a) The land on which vegetation stands is not suitable for cropping
- ☐ b) The cost of clearing does not make further clearing worthwhile
- ☐ c) To preserve flora and fauna
- ☐ d) Erosion control
- ☐ e) Soil salinity control
- ☐ f) Preservation of natural bushland for future generations
- ☐ g) Scenic reasons
- ☐ h) Shade and shelter for stock
- ☐ i) Other – Please specify . . . . . .

If you have cleared land in the last 10 years fill in Q.43, if not go to Q.44.

43. Which of the following statements were your reasons for clearing native vegetations on your property? Please fill in the number which corresponds to the following comments to indicate the priority you gave that reason.

The comments are:

1. Main reason

2. Secondary reason/s

The statements are:

- ☐ a) To increase the area of productive land
- ☐ b) To remove undesirable plants and diseases
- ☐ c) To control feral animals (rabbits, foxes etc)
- ☐ d) To control kangaroo numbers
- ☐ e) To clear unsightly scrub
- ☐ f) Fear of stricter government controls in the future
- ☐ g) To remove a fire hazard
- ☐ i) Other

Please specify

. . . . . .

. . . . . .

. . . . . .

44i. Do you have plans to clear bush in the next 5–10 years?

1 Yes

2 No

3 Possibly

44ii. If 'Yes' or 'Possibly', how many hectares?

. . . . . .ha

If you answered 'No' to Q.44 go to Q.46. If you answered 'Yes' or 'Possibly ', go to question Q.45.

45. Which of the following are your reasons for intending to clear native vegetation in the future? Please fill in the number which corresponds to the following comments to indicate the priority you give the listed reason.

The comments are:

1. Main reason

2. Secondary reason/s

The statements are:

☐ a) To increase the area of productive land

☐ b) To remove undesirable plants and diseases

☐ c) To control feral animals (rabbits, foxes etc)

☐ d) To control kangaroo numbers

☐ e) To clear unsightly scrub

☐ f) Fear of stricter government controls in the future

☐ g) To remove a fire hazard

☐ i) Other – Please specify . . . . . .

46. Are there endangered plants and/or animals on your property

1 Yes

2 No

3 Don't know

4 Don't know and don't care

Section C

This section is to find out how you feel about incentive schemes for the protection and replanting of native vegetation.

47. What would induce you to replant more local native vegetation on your property? Please circle as many as you need.

1 a) A range of local shrubs and trees which were commercially useful

2 b) A better method of direct seeding to plant large areas quickly

3 c) Better financial support for planting efforts

4 d) Clear information on the establishment of windbreak/alley farming on my soil type

5 e) Nothing

6 f) Other – Please specify . . . . . .

48. In Western Australia there are already some incentive schemes to assist landholders to protect remnant vegetation. Which of the following incentive packages would you find most attractive? Please circle the number against the incentive package you choose.

1 a) A grant of $600 per km of fencing with a contract to protect the remnant for 30 years and a memorandum on the title to ensure future owners protect the bushland, plus rate relief on the area protected.

2 b) A grant of $900 per km of fencing with a contract to protect the remnant for 30 years and a memorandum on the title to ensure future owners protect the bushland plus rate relief on the area protected.

3 c) A grant to cover half the total costs of fencing with a contract to protect the remnant for 30 years and a memorandum on the title to ensure future owners protect the bushland plus rate relief on the area protected.

4 d) Other?

Please specify . . . . . .

. . . . . .

. . . . . .

49. What would assist you to better manage/protect the native bushland on your property? Please circle as many as you like.

1 a) Better financial compensation for time and materials required.

2 b) Better compensation for unused land.

3 c) Information which convinces me that the bushland needs managing and of the benefits of management.

4 d) A visit from a person with knowledge of the values of bushland who would provide a feasible management plan for my bush.

e) Nothing 5

5 f) Other?

Please specify . . . . . .

. . . . . .

. . . . . .

50. The preservation of native bushland may have advantages for the farmer in terms of improved yield, soil stability etc. It also benefits the wider community by conserving native flora and fauna. If this is so, who should pay for care of bushland on farms?

To what extent do you think the following groups should contribute to the costs of retaining native vegetation on farmland.

Please fill each box with a number which corresponds to one of the following:

1. A lot

2. Some

3. None

☐ Farmers

☐ Local shires

☐ State government

☐ Federal government

☐ Community or Voluntary groups

☐ Other

☐ Please specify . . . . . .

51. How do you think the money should be raised? If you have any ideas on this, please write them below.

. . . . . .

. . . . . .

. . . . . .

52. To what extent do you think the following groups should become involved in the management decisions involved in retaining native vegetation on farmland.

1. A lot

2. Some

3. None

☐ Farmers

☐ Local shires

☐ State government

☐ Federal government

☐ Community or Voluntary groups

☐ Other

☐ Please specify . . . . . .

Section D

53. Are there any comments you would like to make about anything relevant to native vegetation on farms, land conservation issues, the government departments that provide information on native vegetation and replanting, grant applications procedures or anything else you feel may be relevant.

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .