

**A REVIEW OF THE DEPARTMENT OF CONSERVATION
AND**

**NATURAL RESOURCES RESPONSE TO THE 1994/95
DROUGHT**

December 1996

CENTRE FOR LAND PROTECTION RESEARCH

Technical Report No. 39

M.R. Bluml, J.R. Williamson & R.J. Moran

ISBN 0 7306 6622 0

ISSN 1038 216X

**CENTRE FOR LAND PROTECTION RESEARCH
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT,
VICTORIA.**

Bluml, Martin

A review of the Department of Conservation and Natural Resources response to the 1994/95 drought.

Bibliography

Includes index

ISBN 0 7306 6622 0.

1. Victoria. Dept. of Conservation and Natural Resources.

2. Water Supply - Victoria. 3. Droughts - Victoria

I. Williamson, J.R. (John Robert), 1963-. II Moran, R.J. (Raewyn Judith).

III. Centre for Land Protection Research.

IV. Title (Series: Technical Report (Centre for Land Protection Research (VIC)) : no.39

CONTENTS

EXECUTIVE SUMMARY	1
1. INTRODUCTION	4
1.1 Purpose of the Report	4
2. 1994/95 DROUGHT.....	4
2.1 Climatic conditions during the 1994/95 drought	4
2.2 Land and water conditions during the 1994/95 drought	4
3. DROUGHT POLICY	10
3.1 National Drought Policy	10
3.2 Drought policy reform in Victoria	10
4. DROUGHT COORDINATION.....	14
4.1 Agency and community drought coordination	14
4.2 CNR response to the 1994/95 drought.....	14
4.2.1 CNR Drought Coordination Group.....	14
4.2.2 CNR drought management activities.....	15
5. NRE DROUGHT MANAGEMENT - 1995 AND BEYOND	21
5.1 Drought preparedness - private land	21
5.2 Drought preparedness - public land	22
5.3 Drought preparedness - early warning	23
5.4 Drought Strategic Planning and coordination.....	23
5.5 Monitoring and Research.....	24
6. ACKNOWLEDGMENTS.....	25
7. REFERENCES	25
APPENDIXES	
1. 1982/83 DROUGHT	26
1.1 Climatic conditions during the 1982/83 drought.....	26
1.2 1982/83-Lessons learned by the Soil Conservation Authority	26
2. Emergency water supplies in drought.....	28
3. Guidelines for the development of Stock Containment Areas	31
4. Farm level monitoring kit	33

FIGURES

2.1 Victorian rainfall deciles for 19946
2.2 1994/95 Drought - Monthly soil erosion rating8
2.3 1994/95 Drought - Farm water supply level rating8
2.4 1994/95 Drought - Rabbit induced soil erosion rating9
2.5 1994/95 Drought - Damage to remnant vegetation rating9
3.1 State Government drought declared area 1994.....13

TABLES

2.1 Observed total monthly rainfall as a proportion (%) of mean monthly rainfall at a range of recording stations from June 1994 to June 19957
2.2 Number of days per month with gusts exceeding 40km/h from selected recording stations from June 1994 to June 19957
3.1 Typical support measures provided in times of drought.....12
4.1 Number of stock containment areas constructed per Area under the Land Protection Incentive Scheme.....17
4.2 Number and area of crown land areas made available, and number of crown land areas grazed through the 1994/95 drought.....17

EXECUTIVE SUMMARY

This report provides an overview of the actions of the former Department of Conservation and Natural Resources during the 1994/95 drought. These actions have been critically examined to identify particular areas where the now Department of Natural Resources and Environment (NRE) can improve its performance. In addition, specific recommendations have been made to improve the drought preparedness of both NRE and client group.

‘Drought represents the risk that existing agricultural activity may not be sustainable, given spatial and temporal variations in rainfall and other climatic conditions’ (National Drought Policy, 1990). The above definition forms the basis of the National Drought Policy to which the Victorian Government is a signatory.

NRE has a role managing and protecting the natural resource base on both public and private land. Policy directions for NRE need to be consistent with the framework of the National Drought Policy. Policies and programs need to extend beyond the traditional level of assistance during drought to include; drought preparedness, pre-drought warnings, and post drought management assistance.

Drought conditions experienced in 1994/95 were less widespread than those experienced in 1982/83. Drought conditions were most severe in the Mallee, northern Wimmera, and other areas north of the Great Dividing Range. The drought persisted from early 1994 until the autumn break in 1995. The Victorian Government established a Drought Declared Area on the 21st December 1994 incorporating some of these areas.

In 1994/95 there were fewer of the intense wind and rainfall events which led to extensive soil loss in 1982/83, however soil loss associated with wind erosion was moderate to severe in many areas, particularly the eastern Mallee and north central Victoria. In some instances, experienced field staff of the then Department of Conservation and Natural Resources (CNR) and Agriculture Victoria reported that individual paddocks had shown more severe drought conditions than those of 1982/83. The drought was compounded by high mice and rabbit populations, particularly across the Mallee.

Water storages, rivers and streams, were well below long term averages in much of the drought affected area. Farm water supplies fell to critical levels in early to mid 1995 throughout much of Victoria.

The drought did have some positive environmental impacts. Saline groundwater levels returned to the long term mean in many areas. Drought conditions also enabled cyclic drying of

wetlands to occur, in many instances for the first time since 1982/83.

During the dry conditions which prevailed throughout the autumn and winter of 1994, ongoing discussions were held by CNR staff with the Victorian Farmers Federation (VFF) and individual land owners. Given that dry autumns are common throughout much of the cropping area north and west of the Great Divide, there is no drought until winter rainfall fails. Therefore, the advice to land managers was to wait for winter rainfall. When the winter break did not eventuate in June-August, further preparation for drought was initiated. A Statewide Drought Advisory Committee (SDAC) was then established in September 1994. A CNR Drought Coordination Group (DCG) was subsequently established to coordinate a drought response across CNR, and to provide necessary support to SDAC.

CNR maintained a conservative approach to drought warnings, particularly in cropping areas. This resulted in CNR promoting drought awareness at a time when widespread implementation of proven drought management strategies was required (ie. late spring, early summer). The alternative was to provide an early forecast of drought, with the risk that late winter rains may fall. If this situation had occurred, the credibility of the Department would be at risk, and landowners may decide not to heed future warnings. This dilemma has highlighted the need for NRE and other government agencies to identify a more rigorous approach to monitoring weather patterns and field conditions, with a view to initiating a rapid response to developing droughts. In addition, landowners need to be educated that self reliance will be required in future droughts unless the event is classified as an Extreme Circumstance.

The CNR Drought Coordination Group was successful in coordinating and promoting key drought management strategies. A key to the success was the coordinated approach and delivery of consistent messages from all participating government agencies and the VFF. The establishment of the SDAC overcame the problems of drought coordination and internal communication suffered by the then Soil Conservation Authority and Department of Agriculture in the 1982/83 drought.

On-ground drought management activities promoted included the use of proven drought management measures such as de-stocking and maintaining vegetative ground cover, but also innovative measures such as stock containment areas. Stock containment areas represented an effective technique for land managers to control groundcover deterioration where stock are present. Criteria for the siting, establishment and animal husbandry were developed and a subsidy from the Land Protection Incentive Scheme (LPIS) provided for the development of a stock containment area that met the criteria.

Drought planning seminars were held in conjunction with the then Agriculture Victoria, to disseminate information to land managers.

A qualitative monitoring strategy was implemented at a regional level to measure groundcover, soil erosion, rabbits, remnant vegetation, farm water supply, groundwater levels and environmental streamflows. Regular reporting via field based staff ensured that the DCG were kept informed of drought conditions across Victoria.

Emergency water supplies for rural stock and domestic use was an important drought management issue. The recent restructure and commercialisation of water sector, and the changes associated with the National Drought Policy required that the roles and responsibilities of water authorities needed urgent clarification, particularly in relation to emergency water supplies. A comprehensive discussion paper with 25 recommendations for implementation was prepared for consideration by the SDAC. These recommendations related to drought preparedness, drought management and post drought recovery.

Due to the rapid response time, SDAC had little opportunity for consultation regarding the assistance measures developed for emergency water supplies. Therefore cross compliance (re water cartage and stock containment areas for example) was not implemented.

Emergency stock grazing on crown land was also an important issue raised by the VFF. CNR provided a list of crown land parcels available and suitable for stock grazing. Less than 0.5% of the identified parcels of crown land were ultimately utilised for emergency grazing. A CNR policy was established, stating that National Parks, State Parks and other conservation reserves would not be made available for crown land grazing.

Roadside droving was another grazing issue raised by the VFF. There are no restrictions on stock droving along roads classified as minor roads under the control of Vic Roads. Municipalities may have local laws to control droving but they are inconsistent, and in some cases inadequate. Identification of roadsides suitable for stock movement must take into account the significance of roadside vegetation and should be considered at a catchment wide level.

The National Drought Policy introduced in August 1992 has altered the way we perceive drought. Drought is no longer considered a natural disaster, but a normal and recurring weather pattern. The objectives of the National Drought Policy are to :

- *encourage primary producers and other sections of rural Australia to adopt self reliant approaches to managing for climatic variability;*
- *maintain and protect Australia's agricultural and resource base during periods of extreme climatic stress; and*
- *ensure early recovery of agricultural and rural industries, consistent with long term sustainable levels*

Future policy directions for the Department of Natural Resources and Environment (NRE) must be consistent with the National Drought Policy. The former Water Resources Management Branch of CNR have implemented measures that are consistent with the National Drought Policy to ensure the preparedness of the water sector for drought. Water Authorities have been required to develop appropriate drought response plans, with the aim of minimising the impacts of drought on consumers and the environment. In addition, roles and responsibilities for providing emergency urban and rural water supplies in the event of a very severe drought have been defined.

Catchment and Land Management Division were also making steady progress towards the promotion and implementation of drought management strategies for land managers. Whole Farm Planning courses were being provided to assist with skill development in drought management planning and implementation. In addition, the Commonwealth Property Management Planning Program led to the development of the Victorian Farm\$mart Program. The Farm\$mart Program was developed by CNR in conjunction with Agriculture Victoria and VFF to assist farmers with farm business risk management, including the management of drought risk.

RECOMMENDATIONS

The following recommendations have been developed in line with the National Drought Policy. These recommendations are designed to enhance the ability of NRE and it's clients to prepare for drought, manage drought issues and ensure early recovery of the natural resource base from protracted drought. Recommendations made by the former Water Resources Management Branch of CNR are contained in Appendix 2.

Drought Preparedness - Private land

Recommendation 1

NRE should utilise the Farm\$mart programme to further facilitate the delivery of flexible Whole Farm Planning

workshops that are integrated within the Property Management Planning framework.

Recommendation 2

That development of stock containment areas continued to be subsidised under the Land Protection Incentive Scheme during non drought periods, with a maximum subsidy of \$1000.

Recommendation 3

Develop Whole Farm Planning courses which will satisfy the requirements of taxation incentives for Land Class Fencing and Drought on-ground works.

Recommendation 4

That NRE continue to promote the resource protection and economic benefits of conservation farming, minimum tillage, stubble retention and perennial pastures.

Drought Preparedness - Public Land

Recommendation 5

That the use of National Parks and other conservation reserves as drought refuge for domestic stock be prohibited at all times.

Recommendation 6

That the use of other crown land areas as drought refuge for domestic stock not be promoted, except under extreme circumstances.

Recommendation 7

That NRE continue to promote the development of Roadside Conservation Strategies.

Recommendation 8

That a Roadside Driving Code of Practice be developed in consultation with the Municipal Association of Victoria and Victorian Farmers Federation to provide drivers with clear guidelines for the use of roadsides.

Recommendation 9

That rabbit control programs be continued as a high priority drought preparedness activity, including the establishment of Rabbit Action Groups across susceptible land systems.

Drought Preparedness, Early Warnings

Recommendation 10

That a more rigorous approach to monitoring weather patterns and field conditions be developed by NRE and other

government agencies to assist in identifying the onset of drought.

Recommendation 11

That NRE nominate a Climatic Extremes Officer to coordinate the development of an NRE Plan for Drought and other Climatic Extremes, liaise with other state and Commonwealth agencies, and act as coordinator during extreme climatic events, and facilitate training for staff.

Recommendation 12

That NRE, through the Climatic Extreme Officer, assist CALP Boards in developing contingency plans for the management of extreme climatic conditions, including drought.

Drought Response

Recommendation 13

That NRE maintain a Drought Coordination Group (chaired by the climatic Extremes Officer) with the responsibility of coordinating NRE drought activities during drought, and maintaining drought preparedness activities out of drought, including staff training.

Recommendation 14

That files and information on current technical options for drought management be compiled (including the preparation Drought Landcare notes or a NRE Drought Information Kit) and placed on the NRE Internal Web.

Monitoring and Research

Recommendation 15

That NRE develop methods and techniques for monitoring land and water condition during drought which are linked to the NRE Land and Water Monitoring Strategy.

Recommendation 16

That NRE develop a decision making support system that can be linked to Property Management Planning, and will assist landowners to implement an efficient and cost effective land management option for drought.

1. INTRODUCTION

1.1 Purpose of the 94/95 CNR Drought Report.

This report aims to assess the performance of the Department of Conservation and Natural Resources in responding to the onset of drought conditions in 1994/95. In undertaking this assessment, the report will review the climatic conditions experienced during the drought, the occurrence of land and water degradation on public and private lands, the impact of current Federal and State drought policies on drought management, and the actions undertaken by CNR to alleviate the effects of drought on the natural resource base.

In addition, specific recommendations have been made to improve internal drought policy formation and on-ground action within the newly formed Department of Natural Resources and Environment (formerly the Department of Conservation and Natural Resources and Department of Agriculture, Energy and Minerals).

This document is essentially a summary, therefore detailed regional information is limited. Additional regional reporting would provide a more accurate focus for drought management at a local level.

2. 1994/95 DROUGHT

2.1 Climatic conditions during the 1994/95 drought.

A low pattern of rainfall occurred in 1994/95, this was identified as a 1 in 20 year occurrence by the Bureau of Meteorology. This constitutes a major drought in northern Victoria, and is comparable with the previous six major droughts this century.

The drought was linked to the development of a moderate 'El nino' event. This resulted in the spread of abnormally dry weather conditions to most of southern Australia.

The first indications of oncoming drought occurred when the Southern Oscillation Index became significantly negative in the autumn of 1994. This coincided with much below average rainfall throughout much of the Mallee, northern Wimmera and central Victoria. These dry conditions persisted throughout the major part of the 1994 growing season. The 'El nino' event peaked in December 1994 and began to decay from January to mid autumn 1995. The breaking of the drought Statewide was mild with gentle rainfall events minimising the extent of soil loss.

Severe rainfall deficiencies led to the formation of drought conditions in northern Victoria. Monthly average rainfalls were generally lower than the long term average across most of Victoria, although rainfall levels in Northern Victoria were significantly lower than normal (Table 2.1). Average monthly rainfalls began to return from April 1995 onwards in all districts apart from east Gippsland.

The number of days with wind gusts above 40 km/h in the north west of the State (Mildura) and the east of the State (East Sale) was low compared to Melbourne for the period from September 1994 to April 1995 (Table 2.2). The low frequency of stronger winds in the north west greatly reduced the conditions for wind erosion.

Avoca River Flooding

During the break of the drought in north-central Victoria, heavy rains were experienced in early June 1995 with 100-125 mm of rainfall recorded over a five day period in Avoca, St Arnaud and Charlton. The rains coincided with crop sowing and many paddocks were in a cultivated state with little or no surface cover.

In the district around Charlton, 50-60 % of cropped paddocks were prepared using minimum tillage or direct drilling. The rest of the paddocks were prepared using conventional tillage utilising multiple cultivations. Of the paddocks that had been sown conventionally, significant runoff and soil erosion resulted due to surface sealing and a collapse of the topsoil structure. Damage was most severe on the upper slopes. Paddocks that were prepared utilising minimum tillage or direct tillage techniques showed less soil erosion and crop removal. Yield losses vary from 25 -100% on conventionally cultivated paddocks to 0-25% on minimum tillage or direct drilling paddocks (B. Robb pers comm).

2.2 Land and Water Conditions during the 1994/95 drought

Monitoring of changes in land and water condition was undertaken by members of the CNR Drought Coordination Group on a weekly and then monthly basis. Information collected was based on personal observations and anecdotal evidence from other agency officers and community members. Data from this reports provided an indication for the changing conditions throughout the 1994/95 drought.

Soil Erosion

Soil erosion was moderate to severe between November and February in the Mallee, North Central and North East (Figure 2.2). Erosion by wind was the major cause of soil loss. Conditions in all areas improved from March to May of 1995,

even though soil erosion was higher when compared to a normal season.

In comparison with the 1982/83 drought, weather conditions were more benign with few strong northerly winds and southerly changes. This reduction in strong winds combined with the promotion to land managers of the importance of groundcover retention appears to have decreased the number of wind erosion events and subsequent soil lost. Many of the crops planted in 1994 did not entirely fail, so the area prone to wind erosion was significantly reduced. In addition, landowners experience of 1982 led to much stubble retention. Wind erosion events in 1994 were generally linked to paddocks in which crops failed, and those which were grazed after failing.

Rabbits were a major causal agent in groundcover removal in the Mallee, North Central, North East and South West (Figure 2.4). Locally high rabbit populations residing on public land and linear corridors were responsible for severe damage to crops in the Mallee.

Mice also contributed to the drought conditions in the eastern Mallee. The high mice numbers roughly coincided with areas where grain legume crops were grown in 1993.

Remnant Vegetation

Damage to remnant vegetation was generally minor except for the Mallee, North East and South West (Figure 2.5). Damage to remnant vegetation resulted from lack of water, grazing by domestic stock, Kangaroos and rabbits. Stands of remnant vegetation on private land and along stream frontages were extremely vulnerable to high grazing pressures from both rabbits and domestic stock. Grazing of these areas in the lead up to the drought resulted in significant loss of natural regeneration. Damage to remnant vegetation continued for many months during the drought. The grazing of domestic stock along roadsides also caused similar loss of natural regeneration.

More importantly, stands of remnant vegetation and many roadsides provide safe haven for rare and threatened plant species. Intense grazing of these areas places these species at greater risk.

Groundwater Resources

Important aquifers were monitored during the drought and were compared with the previous two years records (1992/93), and with long term maximums. This revealed that for much of Victoria, groundwater levels had, prior to the drought, been above long term averages. The impact of the drought

was considerable with groundwater levels falling back to the long term mean in many areas. In northern Victoria, the fall in groundwater levels was greater. In some areas, groundwater levels were approaching long term minimum groundwater levels.

Rivers and Streams

Fortnightly streamflow reports indicated that river and stream levels were well below long term averages in central and north west Victoria, and far east Gippsland. Streamflows failed to reach less than 40% of the long term average for the Wimmera River at Glynwylln, Woody Yaloak Creek at Cressy, Avoca River at Quambatook, Werribee River at Ballan, Deep Creek at Bulla, Tallangatta Creek at McCallums, and the Snowy River above Orbost.

Surface Water Resources

A survey of Regional Urban Water Authorities indicated that 10 out of the 17 Authorities had imposed water restrictions during the drought (peak day only), these were;

- Lower Murray,
- Mid Goulburn,
- Goulburn Valley,
- Central Highlands,
- Glenelg,
- Coliban,
- Grampians,
- Kiewa Murray,
- Ovens,
- Western.

In most cases these restrictions were put in place over the dry summer period and were lifted by June 1995.

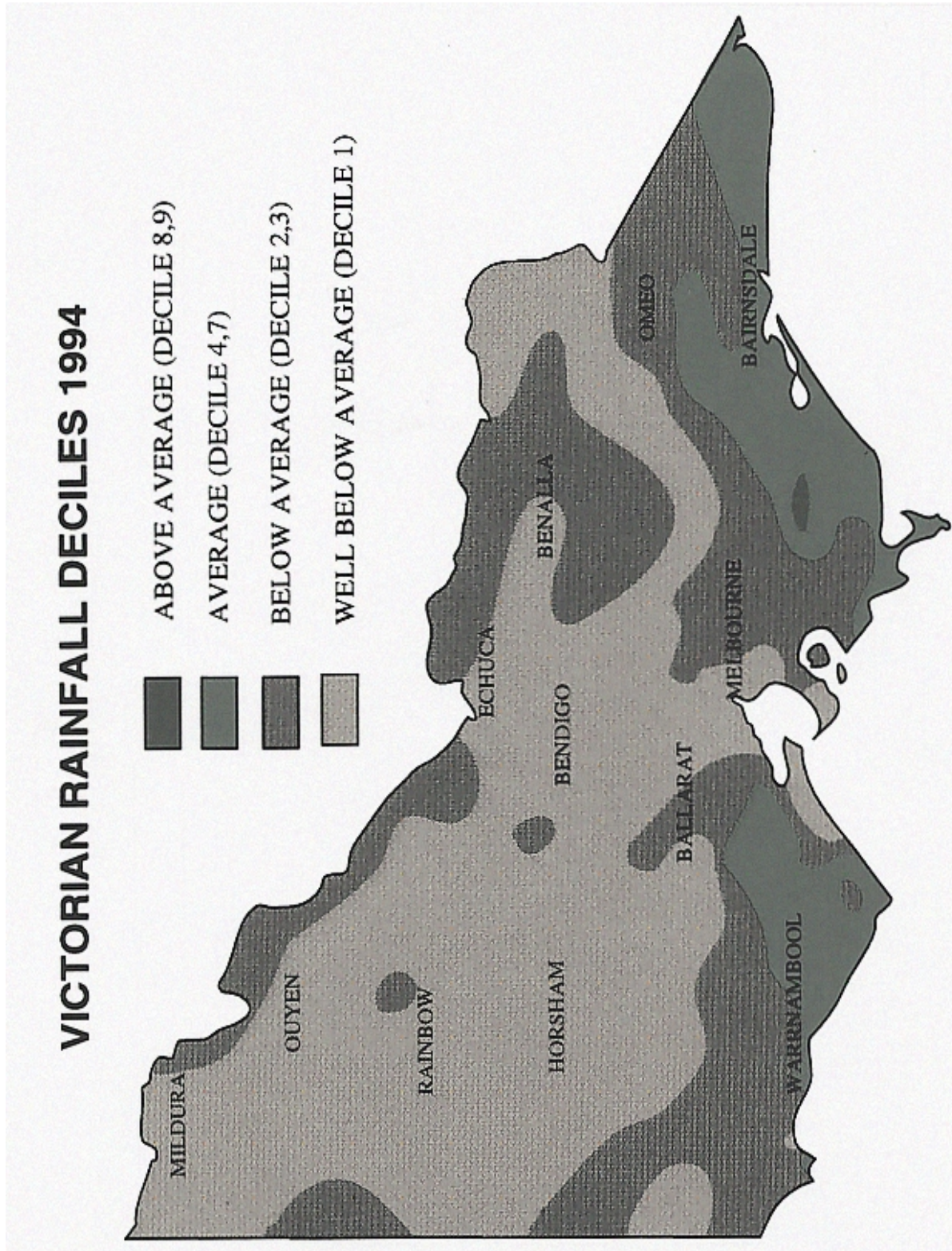
Wind blown sands caused much damage to the stock and domestic water supply channel system. Removal of the material was an urgent consideration for the water authorities. In 1983, the cost of sand removal from channels in the Mallee reached \$1.5 M, however these costs were smaller in 1995 reaching approximately \$150 K.

Farm water supplies deteriorated to critical levels in early to mid 1995 in all districts and remained a significant issue of concern to land managers until the break of the drought (Figure 2.3). As water supplies became depleted, salinity and blue green algae also affected water quality.

Wetlands

The drought provided an opportunity for cyclic drying of wetlands throughout much of south-west and northern

Victoria. Many intermittent and semi permanent wetlands were dry for the first time since the 1982/83 drought. Other permanent wetlands had well below average water levels and significant drying back along the banks.



source : Bureau of Meteorology 1994

Table 2.1 Observed total monthly rainfall as a proportion (%) of mean total monthly rainfall at a range of recording stations from June 1994 to June 1995.

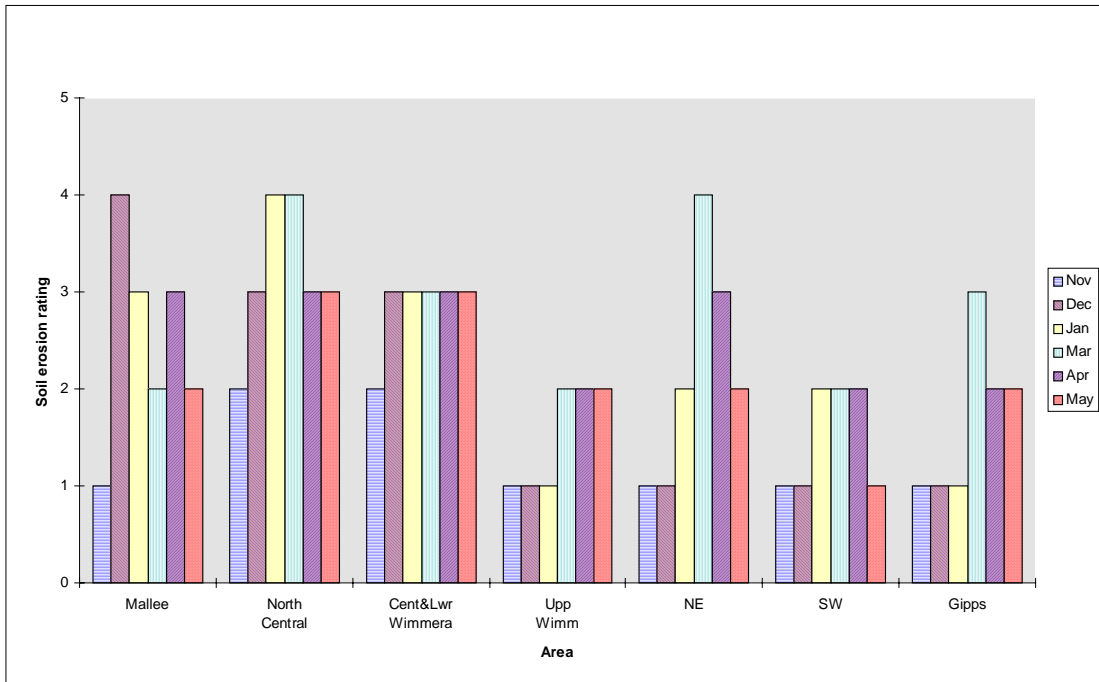
Month	Mildura	Horsham	Charlton	Benalla	Bairnsdale	Ballarat	Melbourne
June 94	125	110	180	95	95	128	82
July	52	57	16	41	27	51	24
August	4	31	55	26	30	55	47
September	55	34	32	46	66	78	53
October	15	91	65	77	74	68	53
November	44	35	55	104	97	85	83
December	22	4	18	9	75	7	25
January 95	236	140	194	253	156	130	210
February	74	76	73	43	153	80	46
March	4	36	25	22	82	104	138
April	57	122	70	108	55	196	176
May	162	100	164	210	94	94	138
June	45	182	278	145	88	123	152

source: Bureau of Meteorology

Table 2.2 Number of days per month with wind gusts above 40 km/h from selected stations from June 1994 to June 1995.

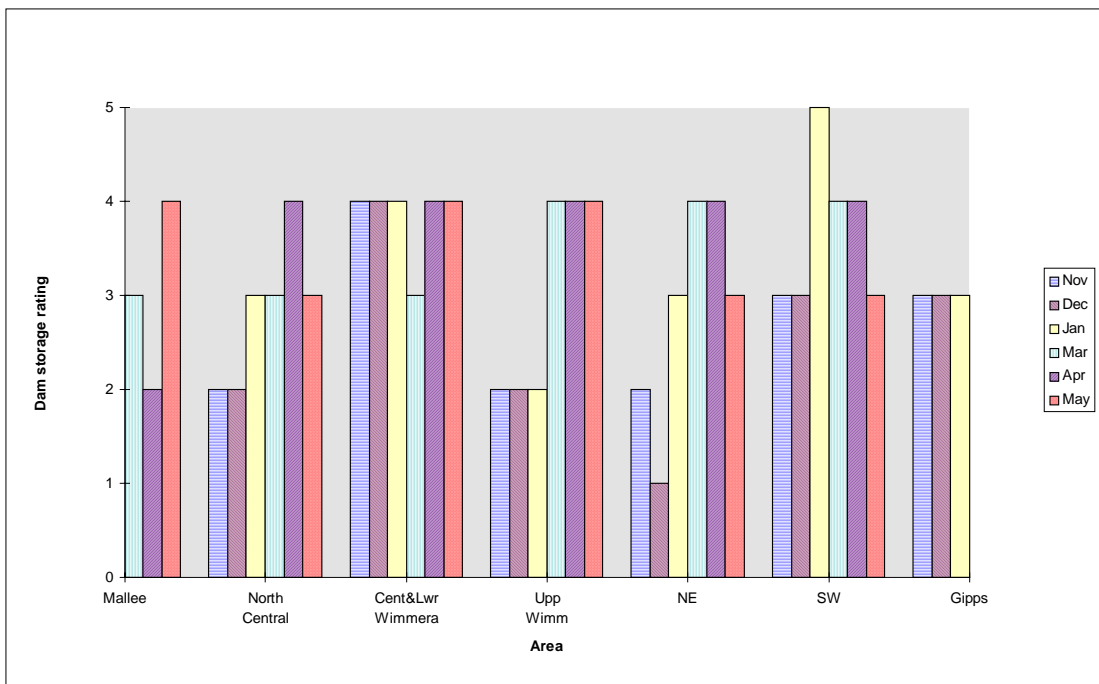
Location	Sept 94	Oct 94	Nov 94	Dec 94	Jan 95	Feb 95	Mar 95	Apr 95
Mildura	0	2	3	0	1	0	1	0
Melbourne	18	20	20	17	14	14	11	17
East Sale	6	2	1	3	2	1	3	3

source: Bureau of Meteorology



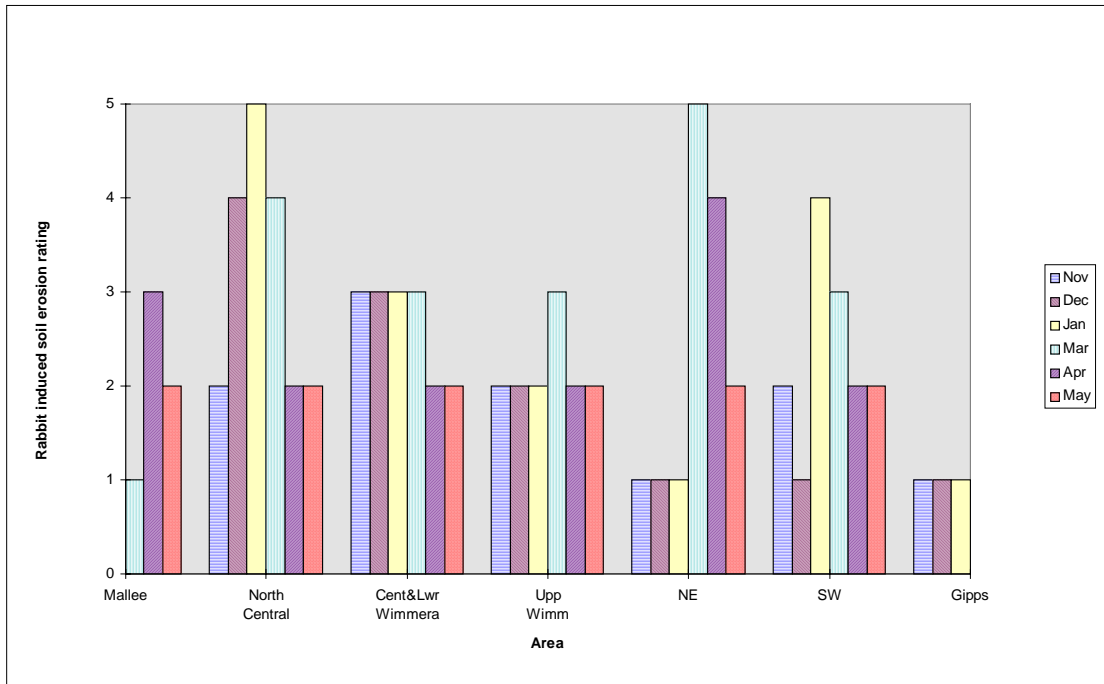
Unchanged from a normal year <1 2 3 4 5> Severe

Figure 2.2. Change in perceived soil erosion as compared with a normal year, between November 1994 and May 1995.



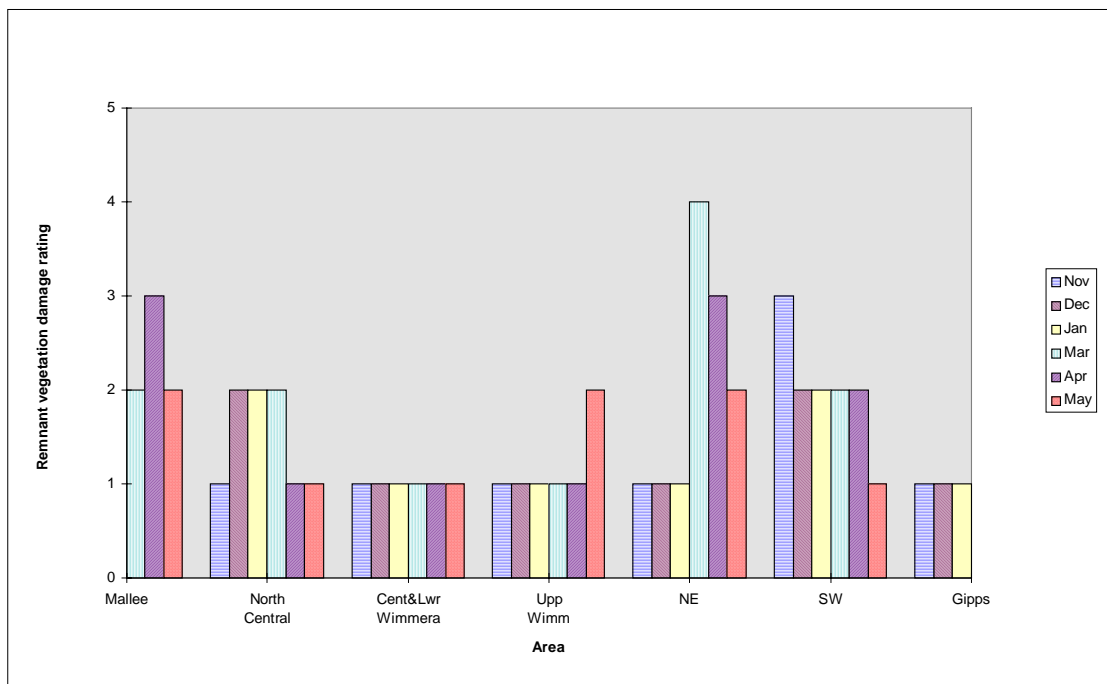
More than 80% of dams effectively full <1 2 3 4 5> More than 80% of dams effectively empty

Figure 2.3. Change in perceived farm water supply levels between November 1994 and May 1995.



No measurable impact <1 2 3 4 5> Major agent of groundcover removal

Figure 2.4. Change in perceived rabbit induce soil erosion between November 1994 and May 1995.



Minimal damage <1 2 3 4 5> Damage beyond recovery

Figure 2.5. Change in perceived drought related damage to remnant vegetation, between November 1994 and May 1995.

3. DROUGHT POLICY

3.1 National Drought Policy.

The National Drought Policy was endorsed by all State Governments in August 1992. The National Policy places emphasis on governments encouraging improved risk management by farmers to cope with drought situations. On farm management will require an integrated approach to financial management, farm productivity and resource protection. To achieve this, the Commonwealth and the States are introducing programs to promote improved financial management by farmers, undertake further research on drought related subjects, and support drought extension.

The objectives of the National Drought Policy are to:

- *encourage primary producers and other sections of rural Australia to adopt self reliant approaches to managing for climatic variability;*
- *maintain and protect Australia's agricultural and resource base during periods of extreme climatic stress; and*
- *ensure early recovery of agricultural and rural industries, consistent with long term sustainable levels*

Specifically the policy consists of a number of components which include; Property Management Planning (PMP), Drought related research and development, Income Equalisation Deposits (IED), Farm Management Bonds (FMB), and the Rural Adjustment Scheme (covering farm improvement, education and training, and exceptional circumstances provisions).

3.2 Drought Policy Reform in Victoria.

The following review of drought policy in Victoria has been extracted from an unpublished paper Drought Policy Reform In Victoria (Agriculture Victoria, 1994).

Drought in Australia has historically been treated as a natural disaster rather than a normal, recurring weather pattern. Therefore, prior to the National Drought Policy in August 1992, both the Commonwealth and Victorian Government had no direct policy to manage drought events.

Prior to June 1989, drought relief was included under the Natural Disasters Relief Arrangements (NRDA) for cost sharing between the Commonwealth and States. Allegations of mal-administration in Queensland resulted in drought relief being removed from the NRDA, and a major drought policy review was commissioned in 1989/90.

Drought Policy for Water Resources in Victoria

After 1989, the Rural Adjustment Scheme (RAS) became responsible for providing shared Commonwealth / State concessional drought relief to farmers. The Rural Adjustment Scheme provides assistance to farmers suffering 'exceptional circumstances' on an individually assessed needs basis.

The reliance of farmers upon a range of subsidies and concessional loans to provide assistance during times of drought has often been counter productive. Subsidies designed to assist farmers with stock retention enabled high stocking rates to be maintained, but also resulted in severe overgrazing and soil degradation. In addition, fodder subsidies provided during times of drought led to increased fodder prices. This had a major impact upon other primary producers such as pig and poultry farmers.

A draft Victorian Drought Policy has been prepared based on the objectives of the National Drought Policy. The draft policy proposes that transaction based subsidies and drought declaration procedures be phased out. This draft is being considered by the Victorian Farmers Federation, therefore a new drought policy framework is yet to be implemented.

Table 3.1 highlights the typical financial support measures provided in Victoria during drought, and indicates which of these are to be progressively eliminated over time.

Victoria is essentially in a transition period. Drought assistance is still administered under the old arrangements, however new policies and institutional arrangements reflect the move towards implementation of the National Drought Policy.

A national approach to the development of a consistent framework for drought declaration and the determination of 'exceptional circumstances' is underway. Under the National Drought Policy it is necessary for both the Commonwealth and State Governments to jointly recognise drought and 'exceptional circumstances' for assistance to be given.

The current criteria for drought declaration and 'exceptional circumstances' were not satisfied during the 1994/95 drought. The Victorian Government declared areas of northern Victoria drought affected (Figure 3.1), however no Commonwealth drought assistance was received by Victorian farmers.

In Victoria, the National Drought Policy has been partially introduced under the Property Management Planning Program. An education and training program called Farm\$mart was formally launched in February 1994 to assist farmers with risk management (including drought risk) within a property management planning framework. This education and training program has been jointly implemented by Agriculture Victoria, Victorian Farmers Federation and CNR.

There have been several structural and legislative changes made in the Victorian water sector since the 1982/83 drought. The water sector is now expected to be self sufficient during drought periods.

The water sector is now managed by the Water Bureau, formerly the Department of Water Resources and Water Resources Management Branch of the Department of Natural Resources and Environment. The Water Bureau is essentially a policy branch with responsibility for monitoring the performance of water authorities. The Bureau is no longer involved in water authority operations. Groundwater functions are also managed by the Water Bureau having previously been managed by the Rural Water Corporation and Department of Water Resources. The Water Bureau has a responsibility to protect water resources and river and wetland ecosystems.

Significant institutional change has occurred within rural and urban water authorities. Amalgamations have led to the creation of three regional rural water authorities and 17 regional urban water authorities.

A review of existing water laws was undertaken to consolidate relevant legislation into one act. The new Water Act (1989) has important implications for water authorities and drought planning.

Water authorities are required by the water Act (1989) to take full responsibility for management of water supplies in relation to consumer needs. This includes responsible management and security of supply during drought events. Water authorities have also been required to prepare Drought Response Plans to manage these periods of short supply. No emergency assistance will be made available to water authorities during drought periods (Table 3.1).

The Water Resources Management Branch prepared a detailed paper on Emergency Water Supplies in Drought. This drought report has summarised the major issues and recommendations presented in the above paper, in Appendix 2.

Table 3.1 Typical Support Measures Provided in Times of Drought.

MEASURE	FUNDING	RECOMMENDATION	COMMENT
BORES: subsidy to municipalities and water authorities for emergency water supplies.	Victorian Government	For water authorities under the Water Act 1989 - to cease immediately For municipalities - to cease as soon as possible but no later than January 1998	
WATER CARTAGE : subsidy to farmers, municipalities and water authorities	Victorian Government	For water authorities under the Water Act 1989 - to cease immediately For farmers and municipalities - to cease as soon as possible but no later than January 1998	
SUBSIDY ON RAIL TRANSPORT:	Victorian Government	As above	Discussions to be held with Dept. of Planning and Development
SUBSIDY ON ROAD TRANSPORT:	Victorian Government	As above	
FODDER SUBSIDY:	Victorian Government	As above	Discussions to be held with Dept. of Planning and Development
SUGAR SUBSIDY:	Victorian Government	As above	
AGISTMENT SUBSIDY:	Victorian Government	As above	
DROUGHT DECLARATION: administered by Dept. of Agriculture	Victorian Government	Abolish immediately as concessional loans under RAS do not require drought declaration process	
DEPARTMENTAL ADVISORY SERVICES	Victorian Government	To continue	Provided by Departments and authorities in drought areas
LIVESTOCK DISPOSAL SUBSIDIES	Victorian Government	To continue	Help needed on public health and animal welfare grounds
CONCESSIONAL CREDIT:	Vic / Comm Government	To continue	Provided through Commonwealth / State Rural Adjustment Scheme

source: Drought Policy Reform in Victoria (unpublished 1994)

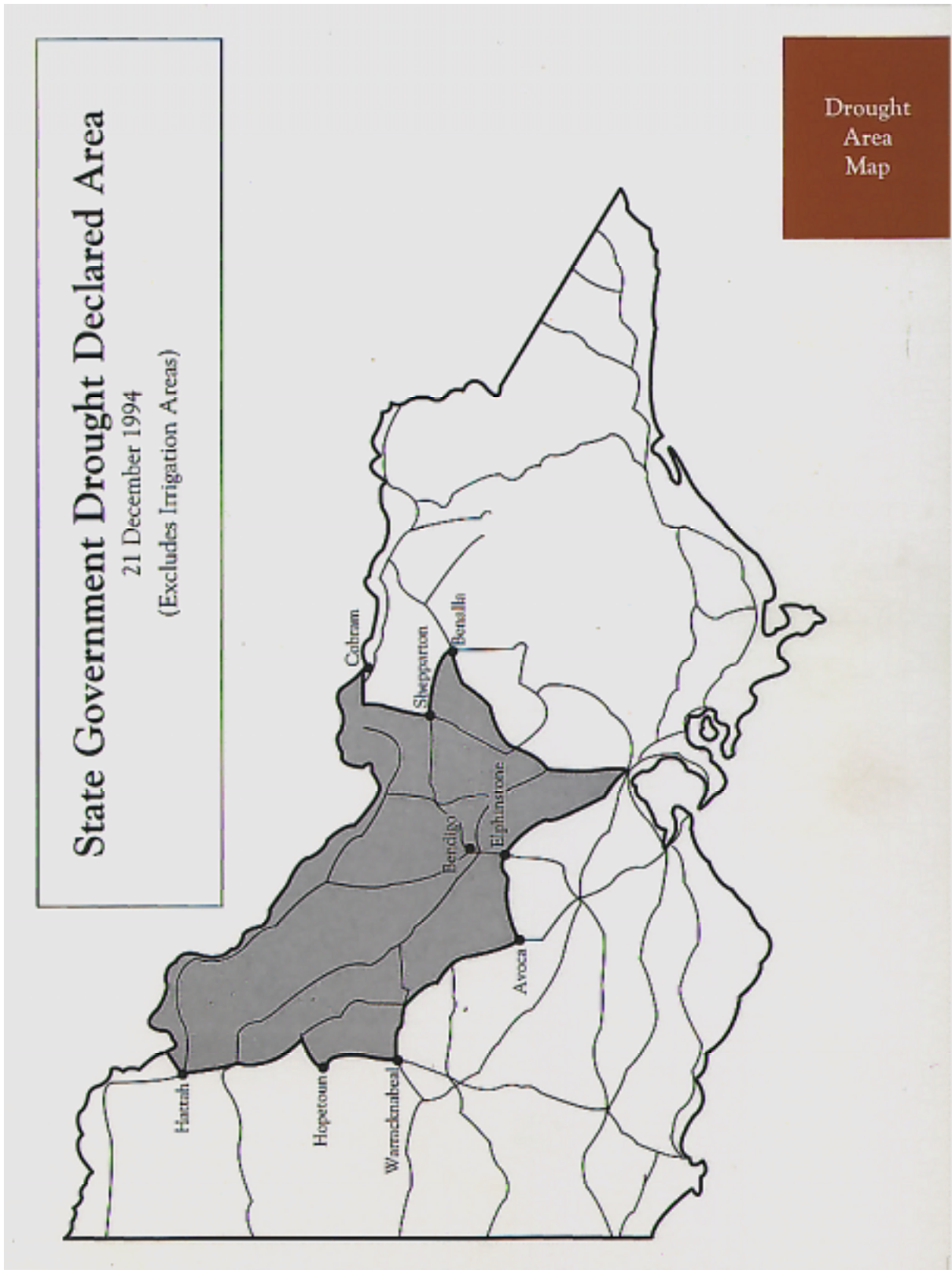


Figure 3.1 State Government Drought Declared Area as at 21/12/1994.

■ Drought declared area

4. DROUGHT COORDINATION

4.1 Agency and Community Drought Coordination

Agency Coordination

Agriculture Victoria was nominated the lead agency for drought in 1994/95. Agriculture Victoria established an inter-departmental advisory committee known as the State Drought Advisory Committee (SDAC). The SDAC was chaired by Bill McGrath, Minister for Agriculture and had senior representation from CNR, Office of Rural Affairs, Rural Finance Corporation, Rural Water Corporation, Office of Regional Development, Department of Treasury and Victorian Farmers Federation. The role of the SDAC was to coordinate and steer drought activities across Government departments and provide a coordinated response to drought associated issues. The SDAC did not have an established drought response policy following the release of the National Drought Policy in August 1992.

The SDAC was established in September 1994 just as farmer and public concerns over drought were surfacing. The SDAC met monthly apart from the worst period of the drought (December to March), when the group met every two weeks. Initially, the Committee's role was pro-active in planning for the drought but became reactive as issues were raised such as stock grazing on crown land.

The SDAC provided a necessary forum for the coordination and implementation of agency programs to manage the impact of drought. The SDAC displayed a coordinated government voice, an action that did not occur in 1982/83.

Community Coordination

Local Drought Advisory Groups were also set up in the Wimmera, Mallee and Loddon-Campaspe. Draft terms of reference and objectives for these groups were established by October 1994, these included;

Terms of Reference

1. *Provide advice and feedback to the State Drought Advisory Committee.*
2. *Consult with Government Agencies.*
3. *Consult between businesses and community groups.*
4. *Contribute to the development of local drought strategies.*

Objectives

- *Participate with the community in minimising the impact of drought in terms of ;*

- *Farm and business viability,*
- *Rural community health,*
- *Natural resource management.*

Given that these groups were still being established when drought conditions subsided, little can be assumed about the impact they may have on drought management in the future.

4.2 CNR response to the 1994/95 drought

The CNR drought response started in December 1991 when information was received that the 'El nino' had become well established over eastern Australia. A major drought was being predicted and the then Land Protection Branch moved to develop a Victorian Drought Strategy with Agriculture Victoria.

This Drought Strategy was not completed as a drought did not eventuate. However, extended drought did occur throughout Queensland and northern New South Wales due to the continuation of the 'El nino' effect. During this time, CNR made a significant contribution to the Drought Policy Review and the development of the National Drought Policy.

In the winter of 1994, the drought spread across southern and eastern Australia, including Victoria. CNR formally took action at the formation of the State Drought Advisory Committee in September 1994. A CNR Drought Coordination Group was established soon after.

It could be argued that CNR's response to the drought was delayed, leading to reactive planning for drought, however, CNR acted in a coordinated way with other government agencies. A delayed public display of action in October 1994 was justified in minimising an over-reaction if normal rainfall events had returned.

Drought prediction and preparedness is extremely important to NRE. Drought declaration usually occurs when shortages in rainfall, water supply and stock fodder, lead to failed crops and deteriorating stock condition. Where the condition of crops and pastures has deteriorated so severely, land and water degradation may be inevitable. NRE needs to be in a position to implement action before a drought declaration is made. This is of greater importance in areas of Victoria where protracted drought is less common and drought management expertise may be limited. This highlights a need for NRE to assist land managers with the development of drought management strategies.

4.2.1 CNR Drought Coordination Group

In response to the SDAC, CNR established a Drought Coordination Group (DCG). Membership of the DCG

included representation from the following CNR branches; Catchment and Land Management (CALM), Water Resources Management Branch (WRMB), Flora Fauna and Fisheries (FFF), and National Parks (NP).

Shawn Butters, John Williamson (Drought Coordinators), Greg Bell, Peter Dixon, Laurie Norman, John Boadle, Bruce Radford, Les Russell, Shelley McGuinness, Peter Thomas, Peter Berg, Steve Erlandsen, Clem Sturmfels, Phillip Dyson, Trevor Miles (CALM), John Cooke (FFF), Rae Moran (WRMB), Kevin Ritchie (NP).

At the first meeting of the group in October 1994, the objectives, strategy, general extension messages and campaign were developed. The group met from then on at monthly intervals, either face to face or teleconference. The Group disbanded at the break of the drought in June 1995.

DCG Objectives

The objective of this group was to provide a coordinated response to assist with the protection of topsoil, natural values, waterways and core breeding stock, with due regard to the social needs of land managers in addition to being a conduit for information to and from the State Drought Advisory Committee and CNR management.

DCG Strategy

The broad strategy of the group was to;

- *work closely with Agriculture Victoria to promote a common message,*
- *assist with early action as a preventative measure rather than emergency action or remedial works,*
- *highlight the positive implications of advice,*
- *involve and work with the community,*
- *develop and influence others to develop effective policies,*
- *ensure staff support,*
- *utilise the lessons of the 1982/83 drought,*
- *strategically monitor conditions, both climatic and the natural resource base*
- *consider the use of cross compliance measures.*

The group activities developed to deal with three phases of a drought, pre- drought preparation, drought management, and post-drought recovery and evaluation. The boundaries between these phases were not clear and would vary from area to area. In addition to this, three 'length of drought' scenarios were developed;

1. *A 6 - 8 month summer drought with a 'normal break in autumn/winter*
2. *An 18 month drought with no effective autumn/winter/spring rains in 1995.*
3. *An extended drought.*

At the planning stage for the DCG,

Scenario 1. was already a reality (October 1994) throughout most of the country north of the Divide.

Scenario 2. was a possibility (after the 1982/83 drought) and consequently, extension messages were developed with an 18 month drought in mind.

Scenario 3. was historically unusual for Victoria and the best on-ground management plans would be unable to prevent land and water degradation.

Of the three scenarios considered, Scenario 2 was the most likely and was used for development of the extension and other components of the drought response.

DCG Extension

A general extension message was developed for CNR officers to promote in their local areas. The message was consistent with that coming from Agriculture Victoria. The message contained a number of components which were developed to protect the natural resource base and encourage post-drought recovery by land managers. The message is outlined below;

- *to minimise soil erosion,*
- *to minimise the loss of soil nutrients,*
- *to minimise irreparable damage to perennial pastures,*
- *to avoid soil conservation works such as ridging and ripping.*
- *to provide techniques to allow a rapid recovery from drought in terms of feed and finance,*

4.2.2 CNR Drought Management Activities

Drought Planning Seminars

Public seminars were run by CNR in conjunction with the Agriculture Victoria to provide drought preparatory information. The information included the development of feed and water budgets as a method of determining the potential costs (financially, physically and environmentally) of maintaining current stock levels. These seminars were held prior to Christmas 1994.

An inter-agency workshop was also held at Tatura on the 9th of September 1994. The purpose of this workshop was to

allow experienced staff from 1982/83 to brief inexperienced staff on drought management procedures and actions.

Other seminars were run as a component of the FarmSmart program highlighting the changes in the Federal and State Government Drought Policies.

Drought Landcare Notes

To assist landholders implement drought management strategies, a series of drought Landcare Notes were produced. A number of these Notes were included in the Drought Information Services Handbook released in January 1995 by Agriculture Victoria.

Stock Containment Areas

Stock Containment Areas were considered by the DCG as a way to promote the retention of groundcover over the majority of a property in addition to maintaining a core herd or flock. The basic concept was to isolate all stock on a property into one or two 'feedlots' or 'containment areas'.

Areas to be utilised for stock containment had general guidelines prepared relating to location in the landscape, shade requirements, water supply and stock numbers. A subsidy of up to \$1,000 per stock containment area was provided through the Land Protection Incentive Scheme (LPIS). This subsidy was paid provided the core criteria were met and the receipts for approved expenditure were produced by the landholder. An inspection of the area by CALM staff was required prior to the approval of the subsidy. No cross compliance was required in respect to the provision of other drought assistance and having a stock containment area. Guidelines for the establishment of stock containment areas through LPIS are presented in Appendix 3.

Table 4.1 indicates the adoption rate of stock containment areas in each CNR Area under the Land Protection Incentive Scheme.

Crown Land Grazing

Early in the drought, the VFF made a request through the State Drought Advisory Committee for the use of parcels of crown

land for stock grazing. CNR was requested to provide a list of suitable parcels of crown land for stock grazing.

Assessments were required to provide the following information for each parcel of land;

- *natural assets present that may be irrevocably damaged by well managed grazing,*
- *the total number of grazing days available and the optimum duration of grazing,*
- *the necessary fencing and water infrastructure that any prospective user would have to establish,*
- *any limitations with respect to stock class or type,*
- *the necessary weed control measures applicable.*

Assessments were made by CNR and Agriculture Victoria staff.

A policy was established that National Parks, State Parks and other Conservation Reserves protecting significant natural values would not be made available for grazing.

Parcels of land identified as being suitable were released for expressions of interest through local VFF branches and the local media. Applications for each parcel of land were reviewed by CNR officers and a representative of the VFF using the following criteria;

- their willingness and ability to meet the management requirements of the parcel of land in question,
- their requirement for emergency grazing in terms of maintaining core breeding stock and other drought measures already undertaken, such as destocking.

The final selection between applicants of equivalent need was determined by ballot with all applicants advised of the outcome as soon as possible following the ballot. Ongoing inspection of the site was the responsibility of CNR officers.

The use of crown land parcels for grazing was extremely low (Table 4.2). Only one 80 ha parcel of land was utilised.

Table 4.1 Number of Stock Containment Areas completed using LPIS funds 1994/95.

CNR Area	No. applications for Stock containment areas	No. of Stock containment areas completed	Total Subsidy \$
Port Phillip	0	0	0
North East	0	0	0
North West (Mildura)	19	12	9,420
(Bendigo)	30	30	30,000
South West	NA	22	14,085
Gippsland	0	0	0

Table 4.2. Number and area of crown land areas made available and number and area of crown land areas grazed throughout the duration of the 1994/95 drought.

CNR Area	Areas available	Area (ha)	Areas utilised	Area (ha)
Port Phillip	3	110	0	0
North East	1	8000	0	0
South West	10	394	1	80
North West	5	13,950	0	0

Roadside Droving

The drought conditions in NSW and QLD resulted in the movement of approximately 33,000 interstate cattle and sheep along Victorian roadsides. Given that local graziers may require the use of roadsides at a later time, there were a number of issues to be resolved. These were:

- introduction of weeds,
- land and vegetation damage,
- damage to private infra-structure,
- animal welfare,
- traffic hazards,
- roadside water reserves, and
- right of access to the roadside.

Apart from provisions under municipal local laws, there were few laws and regulations to control the movement of stock. To co-ordinate the control of stock droving, a number of meetings were held at Birchip, Bendigo and Mortlake between local government, CNR, Agriculture Victoria, VicRoads and the VFF. The outcome of the Bendigo and Birchip meetings was a list of issues that should be considered when drawing up local laws. These laws should be considered, refined and implemented by the relevant authorities. The list of issues included;

- uniformity of laws, procedures and permits,
- prior notice of 7 days before a permit can be issued,
- a bond of \$500 with the permit application,
- agistment fee,
- set stock routes and campsites,
- maximum mob size,
- no fees for local land owners moving stock,
- public liability insurance for drovers,
- advisory signs, and
- adequate supervision.

Pest Plants

Pest plants become a major problem for both public and private land managers after protracted drought. The dispersal of seed is aided by strong wind and loss of groundcover during drought. Weeds rapidly establish after drought breaking rainfall occurs. Although not well documented, it is evident that CNR has made a significant effort to control weeds after the 1994/95 drought. For example, the National Landcare Program has funded a drought related program to eradicate environmental weeds in the Mallee totaling \$72,300.

Farmers also face the additional costs associated with eradication of weeds after drought.

Pest Animals

The onset of the drought also highlighted the potential impact of pest animals such as rabbits and mice. Kangaroos were also a problem in certain areas of the State.

Rabbits are capable of extreme damage to both crops and pasture in times of drought. Rabbits numbers were monitored carefully with transects and targeted control programs operated on public land. On private land, Good Neighbour and Landcare related rabbit control programs and were also undertaken. In the Mallee alone, over 500 tonnes of rabbit baits were laid over the period of February to March 1995.

The impact of rabbits during the 1994/95 drought was marked. Large areas of pasture and crop were laid bare in areas with high concentrations of rabbits. CNR also suffered significant criticism in parts of the Mallee as rabbits present on public land were threatening adjacent crops.

Although not directly related to drought, the 1994 mouse plague had a major impact on ground cover in parts of the Wimmera and Mallee. Emerging crops were often eaten off, in some cases destroying the crop. Paddocks were left with minimal groundcover and were therefore subject to wind erosion. CNR was responsible for coordinating baits for a mouse eradication strategy. Two regional committees were set up in the Wimmera and Mallee to oversee the eradication programs. There were two major eradication programs implemented;

1. Coordinated Baiting Program - this included the setting up of bait stations for protection of targeted assets such as crops, intensive agriculture and houses.
2. Broadcast Strychnine Baiting - this involved broadcast baiting by land managers under strict conditions of use, with follow up monitoring of off-target damage undertaken by CNR.

Both eradication programs were considered successful in protecting crops and other assets.

Kangaroos became a problem on both private and public land during the drought. On public land reserves, high concentrations of kangaroos caused widespread overgrazing of shrubs and native pasture, particularly in Hattah Kulkyne, Wyperfeld, and Murray Sunset National Parks. Later in the drought, kangaroos began to move out of public land reserves as groundcover became scarce.

Roaming mobs of kangaroos placed intense pressure upon adjacent private land, especially in cropping areas such as

Wemen which adjoins Hattah Kulkyne National Park. In this area Kangaroos caused major damage to both crops and pasture.

Monitoring

State-wide Monitoring

The DCG compiled Drought Reports that included mostly qualitative reports on soil erosion, groundcover levels, farm water supplies, stream and groundwater levels (contracted out to HydroTechnology), rabbits, remnant vegetation, and drought extension activities. Reports were completed at weekly or fortnightly intervals (monthly towards the end of the drought), with the information being compiled centrally and reported back to the State Drought Advisory Committee. This form of reporting was considered satisfactory for the rapid collection and compilation of information on the condition of the natural resource base. However it was generally accepted that improvements in the monitoring of base line conditions and the performance of drought management techniques can be made.

Farm Level Monitoring

A farm level paddock and water supply monitoring kit (Appendix 4) was developed to allow land managers to monitor the changes in the natural resource base. Information collected as part of the kit was to be processed centrally with a report returned to the land holder. The kit was not accepted by the farming community and no responses were returned for analysis.

Rural Stock and Domestic Water Supplies

As conditions became drier towards the end of 1994, it was evident that decisions were needed to ensure a timely and effective response to water shortages in relation to urban supplies, irrigation and other rural supplies. Given the major restructuring and the commercialisation of the water sector and the changes in National Drought Policy that had occurred since the last major drought in 1982/83, roles and responsibilities in relation to emergency water supplies were not clearly defined in some instances, and in other instances key processes had still to be put in place. A paper on Emergency Water Supplies was prepared by the Water Resources Management Branch in November 1994, which identified 15 outstanding issues to be addressed, and made 25 recommendations for action.

The issues identified were:

1. Responsibilities for emergency stock and domestic rural supplies.
2. Funding of emergency water supplies.
3. Handling of groundwater enquires.

4. Status of existing emergency bores.
5. Groundwater drilling capacity/arrangements.
6. Managing increased groundwater extractions in drought times.
7. Water cartage.
8. The nature and cost of specific assistance measures.
9. Mechanism for monitoring the state of farm storages.
10. Mechanism for monitoring the state of streamflows and groundwater throughout the State.
11. Mechanism for monitoring the state of irrigation supplies and major storages.
12. Mechanism for monitoring the state of urban supply systems.
13. Preparedness of urban water authorities operating under the Local Government Act.
14. Water allocation in drought times.
15. Arrangements for coordinating response at a State-wide level.

The various recommendations and their status of implementation were outlined under 3 major headings;

- A. Preparation for Drought
- B. Funding and Coordination of Emergency Water Supply Assistance
- C. Administrative Arrangements for Groundwater.

A summary of these issues is presented in Appendix 2.

Surface Water Resources

HydroTechnology was contracted to develop and provide regular "State of the Streams" reports, the first report was prepared on 2 December 1994 and reporting continued on a fortnightly basis until June 1995; reports have subsequently been prepared at the end of each month.

Groundwater Resources

HydroTechnology was contracted to develop and provide groundwater status reports, the first report was prepared for December 1994 and reporting continued on a monthly basis until the end of June 1995.

The RWC was contracted to investigate the condition of emergency groundwater bores located in the most seriously drought-

affected areas north of the Divide. This study was completed in January 1995. Of a total of 55 bores investigated, 25 bores were found to be operational; 17 were potentially operational; and 13 were unusable. At the 3 sites where there was a need for establishing supplementary supplies, the relevant shires carried out the necessary works.

Environmental Water Allocations

The Bulk Water Entitlement process (including the development of Stream Management Plans for unregulated streams) will largely define sharing arrangements in drought times. The Rural Water Authorities will consult with regional staff to determine

an appropriate rostering strategy for unregulated streams in situations where environmental flows have not been formalised.

The actual extent of consultation undertaken with Rural Water Authorities in developing and applying rostering arrangements is not known.

The environmental water allocation set aside for wetlands was sold to Victorian and New South Wales irrigators during the drought. The drought provided an opportunity for cyclic drying of many wetlands, in particular those identified in the Kerang Lakes Wetland Strategy.

5. NRE AND DROUGHT MANAGEMENT-1995 AND BEYOND

The concept and definition of drought has made a quantum leap over the last decade. Drought has evolved from a natural disaster that is based solely on an aberration of average climatic conditions to a naturally occurring component of Australia's climate that requires appropriate management. The current definition of drought is;

'Drought represents the risk that existing agricultural activity may not be sustainable, given spatial and temporal variations in rainfall and other climatic conditions' (National Drought Policy, 1990). The above definition forms the basis of the National Drought Policy to which the Victorian Government is a signatory.

NRE has a role managing and protecting the natural resource base on both public and private lands. Policy directions for NRE need to be consistent with the framework of the National Drought Policy. Policies and programs need to extend beyond the traditional level of assistance during drought to include; drought preparedness, pre-drought warnings, and post drought management assistance.

The action already taken by the Water Bureau to ensure the preparedness of the water sector for drought covers all these phases of action, with the aim of conserving resources and minimising the impacts of drought on consumers and the environment. Recommendations on emergency water supplies in drought are contained in Appendix 2.

5.1 Drought Preparedness on Private Land

Managing for drought is about managing the risks involved in carrying out an agricultural business in a country that has significant climatic variability. Drought represents the risk that climatic conditions from time to time will not adequately sustain agricultural activity over one or more seasons. The risks include land and water degradation, either temporarily or permanently, financial risks associated with a lack of income generating activities, and capital and plant run down. The National Drought Policy concludes that drought related risk is no different to risk associated with running a farm business. Therefore management of drought risk is the responsibility of the land manager except under 'exceptional circumstances'.

Since the 1982/83 drought, land managers have been encouraged to prepare for drought through Whole Farm Planning courses run by NRE and other providers. These courses are effective in respect that instil the message of 'preparedness'. These courses included the development and maintenance of farm water supply, but did not deal with water and feed budgeting, or the development of drought strategies and action plans.

Whole Farm Planning still provides the best technique for skilling landholders in appropriate land and water management techniques, in addition to developing a physical farm plan that will assist in minimising land and water degradation under all climatic conditions.

Through the National Drought Policy, the Property Management Planning campaign was developed from which Victoria responded by developing the Farm\$mart program. The major aim of Farm\$mart is to educate land managers in farm business risk management, including the development of risk management strategies for managing a property through all climatic conditions.

NRE has the ability to capture funding for the development of risk management strategies to protect the natural resource base on private land. A review of the Farm\$mart program has recommended that Whole Farm Planning Courses be linked more strongly with Farm\$mart. The aim would be to develop and facilitate the delivery of a Whole Farm Planning course that will incorporate both risk management and natural resource planning (Williamson, 1996).

Recommendation 5.1.

NRE should utilise the Farm\$mart program to further facilitate the delivery of flexible Whole Farm Planning workshops that are integrated within the Property Management Planning framework.

Monitoring and follow up after the drought, suggests that stock containment areas were extremely successful in retaining groundcover. Strategically placed stock containment areas can be utilised for a range of farm management activities throughout the seasons. These areas represent the best technique for land managers to implement the groundcover retention strategy promoted by both agencies. When developed with appropriate water, feed, and de-stocking strategies, stock containment areas provide a major leap forward in drought preparedness and management. Ideally, stock containment areas should be identified and implemented as part of a Whole Farm Plan.

During the 1994/95 drought, Land Protection Incentive Scheme grants were utilised during the drought to encourage the construction and use of stock containment areas. A maximum subsidy of \$1,000 was provided for each stock containment area. This subsidy was effective in encouraging the development of numerous stock containment areas way to destock properties and retain groundcover. Continued subsidisation of stock containment areas continues to be recommended, particularly their establishment during non-drought periods.

Recommendation 5.2.

That development of stock containment areas continue to be subsidised under the Land Protection Incentive Scheme during non-drought periods, with a maximum subsidy of \$1000.

The promotion of stock containment areas will necessitate further skilling of land managers, particularly in water and feed budgeting, and animal husbandry in a feedlot situation. This information can be provided as part of a Whole Farm Planning course or through the Farm\$mart program.

The Commonwealth government has provided Land Class Fencing and Drought Taxation incentives under Section 75D of the *Income Tax Assessment Act 1936*. Land Management and Water Conservation Plans are required for the Land Class Fencing and Drought taxation incentives respectively. It would be desirable for NRE to develop Whole Farm Planning components which will satisfy the prerequisites for this form of drought assistance. This may provide added incentive to land managers to participate in a Whole Farm Planning course and commence the implementation of the plan.

Recommendation 5.3

Develop Whole Farm Planning courses which will satisfy the requirements of taxation incentives for Land Class Fencing and Drought on-ground works.

Many of the areas that were prone to wind erosion during the 1994/95 drought had failed crops, particularly grain legumes on lighter soils. Crop failure is a risk that is difficult to manage, however the environmental impact of failed crops can be managed by destocking and the use of minimum tillage and stubble retention. Stubbles retained from the 1993 season would have provided an important buffer from wind erosion. Minimum tillage and stubble retention also had a positive benefit in minimising soil loss due to run-off associated with intense rainfall events in the Charlton District.

Minimum tillage and stubble retention have received negative press over the last few years, particularly following the mouse plague and links with continuous cropping. However further extension is required to highlight the benefits through all climatic cycles.

Anecdotal evidence also suggests that those farmers with a high level of perennial pasture were able to maintain herds and flocks longer with subsequent savings on feed purchases and reduced stock rationalisation.

The management of perennial pastures during drought is particularly important where large private and public investment has been made under the Salinity Program.

Recommendation 5.4

That NRE continue to promote the resource protection and economic benefits of conservation farming, minimum tillage, stubble retention and perennial pastures.

5.2 Drought Preparedness on Public Land

Issues related to drought preparedness on public land are different to those on private land due to the lower level of human intervention in respect to management during and between droughts. Two issues arose during the 1994/95 drought, namely crown land grazing and roadside grazing.

CNR was involved in identifying suitable areas of crown land for emergency grazing areas. National Parks and land of high conservation value were excluded from emergency grazing. Less than 0.5% of the crown land identified for emergency grazing was utilised. Given the move towards land managers becoming self-reliant, and combined with the poor uptake of crown land grazing in 1994/95, it is believed that crown land grazing by domestic stock should not be promoted except under extreme circumstances, or where grazing is required by NRE for the continued management of those lands.

Recommendation 5.5

That the use of National Parks and other conservation reserves as drought refuge for domestic stock be prohibited at all times.

Recommendation 5.6

That the use of other crown land as drought refuge for domestic stock not be promoted, except under extreme circumstances.

There are two aspects to droving of domestic stock along roadsides; the movement of stock, and grazing of roadsides for fodder. Given the move toward self reliance in farming, and the need to protect significant roadside vegetation, the continued use of roadsides for fodder grazing should be evaluated by NRE.

Current state legislation allows the movement of stock without due consideration of land, vegetation and water values along roadsides that are not declared major roads under the authority of VicRoads. Control of the movement and grazing of stock on the majority of roadsides becomes a municipal issue. Regulations present in most Shires are inadequate to control the movement and grazing of stock on roadsides. Subsequently, the Municipal Association of Victoria has developed a model local law on livestock, a component of which controls the movement of stock and the type of road that stock can be moved on. This law allows grazing routes to be

determined in consultation with NRE at any time. To date, approximately four shires have adopted this model local law in whole or in part.

A number of municipalities have been involved in the development of roadside management strategies for roadside vegetation. These strategies should be promoted within other rural municipalities and should take into consideration; flora and fauna values, potential for land degradation, grazing potential, and likely damage to private infra-structure. This will establish suitable droving routes well in advance of drought.

To provide a coordinated approach, it is imperative that CALP boards include this issue as a component of their Catchment Management Strategies. The Boards input will be important in identifying agreed stock droving routes across existing municipal boundaries.

Recommendation 5.7

That NRE continue to promote the development of Roadside Conservation Strategies.

Control of stock droving along roadsides became an issue during the 1994/95 drought. A number of concerns including law uniformity, bonds and maximum mob sizes were raised. The development of a Roadside Droving Code of Practice referred to in municipal by-laws will provide a level of expectation by State and Local governments to those moving or grazing stock on roadsides.

Recommendation 5.8

That a Roadside Droving Code of Practice be developed in consultation with the Municipal Association of Victoria and Victorian Farmers Federation to provide drovers with clear guidelines for the use of identified roadsides.

Vermin, particularly rabbits are a major catalyst for groundcover removal and soil disturbance preceding and during times of drought. In the 1994/95 drought, rabbits were considered by NRE officers as a major casual agent in groundcover removal. Effective rabbit control should be a high priority activity to prepare for oncoming drought. This will aid in minimising crop damage, loss of groundcover, and soil erosion during drought.

Recommendation 5.9

That rabbit control programs be continued as a high priority drought preparedness activity, in particular the establishment of Rabbit Action Groups across susceptible land systems.

5.3 Drought Preparedness, Early Warnings

A component of the success of the State Government 1994/95 drought response was the establishment of a coordinated inter-department advisory group when suggestions of a drought were first mooted. Although government concern over an impending drought were not relayed to the public, early action enabled government strategies to be developed in a logical and systematic way.

Issues which are still to be addressed include; the identification of conditions which confirm a drought is in progress, and the timing for implementation of drought strategies. The Commonwealth in consultation with the States have developed criteria for determining drought exceptional circumstances. However these criteria are considered too severe for a 'typical' Victorian drought. Specific criteria need to be established for Victoria, and indeed regions of Victoria. This will assist in the determination of conditions that are likely to lead to a drought.

Recommendation 5.10

That a more rigorous approach to monitoring weather patterns and field conditions be developed by NRE and other government agencies to assist in identifying the onset of drought.

5.4 Drought Strategic Planning and Coordination

The CNR Drought Coordination Group was effective in developing extension campaigns and coordinating on-ground activities across the drought affected areas. Group members also acted as the key CNR drought contacts at the regional level.

The rate of change in drought policy over the last few years has changed the way NRE will respond to future droughts. In addition, changes brought about by the amalgamation require that strategic planning for drought, and indeed other climatic extremes, should now be considered a priority. A proportion of an officers time should be dedicated to developing a NRE drought strategy in consultation with CALP council and boards, the VFF, all relevant NRE businesses and other stakeholders. This officer would also provide a coordination role for extension programs including Property Management Planning and Whole Farm Planning, and assist in the training of relevant staff.

Recommendation 5.11

That NRE nominate a Climatic Extremes officer to co-ordinate the development of an NRE Plan for Drought and other Climatic Extremes, liaise with other state and Commonwealth agencies, act as coordinator during extreme climatic events, and facilitate training for staff.

CALP Boards will have an important influence upon the timing and coordination of any drought response within their particular catchments. Boards are moving towards, or are preparing contingency plans to cope with a wide range of climatic extremes. This will involve the redirection of existing funding to priority areas to ensure that soil, water, and biodiversity issues are adequately managed during extreme climatic conditions. The redirection of funding would involve diverting resources which can no longer be wisely utilised for their intended purpose (due to the prevailing conditions), to other priority issues emerging from the extreme climatic conditions.

Recommendation 5.12

That NRE, through the Climatic Extremes Officer, assist CALP Boards in developing contingency plans for the management of extreme climatic conditions, including drought.

Recommendation 5.13

That NRE maintain a Drought Coordination Group (chaired by the Climatic Extremes Officer) with the responsibility of coordinating NRE drought activities during drought, and maintaining drought preparedness activities out of drought, including staff training.

Considerable effort was concentrated on the writing and update of drought Landcare notes, including information relating to the development of stock containment areas. This information was incorporated into the Drought Information Services handbook. As a commitment to better client services, regular updating and publication of drought Landcare notes should occur. In addition, access to technical information concerning drought by NRE field staff can be improved through use of the NRE Internal Web.

Recommendation 5.14

That files and information on current technical options for drought management be compiled (including the preparation Drought Landcare notes or a NRE Drought Information Kit) and placed on the NRE Internal Web.

5.5 Monitoring and Research

The success of CNR drought activities during 1994/95 is difficult to assess due to the lack of an effective monitoring system. The weekly and monthly drought reports compiled by CNR drought coordinators provided useful, but subjective information on perceived land and water conditions. However no statistically valid data was available to assess recommended management options.

A community based monitoring kit was developed during the drought. The kit was capable of providing useful information to land managers and NRE staff, however the uptake of the kit by land managers was poor due to its complexity.

There is an opportunity to develop methods and techniques for the monitoring of land and water condition during drought as a component of the NRE Land and Water Monitoring Strategy. This Strategy supports the monitoring and assessment requirements of NRE, CALP Council and Boards, and will enable Government to make informed decisions about investing in sustainable management of land, water and environmental resources.

Recommendation 5.15

That NRE develop methods and techniques for monitoring land and water condition during drought which are linked to the NRE Land and Water Monitoring Strategy.

Although accepted technical options exist for the management of drought on cropping and grazing lands, little or no information is available to landowners to assist them in identifying the most appropriate option for their property.

The development of a decision making support system would provide farmers with an ideal tool for selecting the most efficient and cost effective land management practice for their property. This would involve gathering information on the following :

- i) efficient and cost effective drought management practices for cropping and grazing enterprises on various land types,
- ii) the predicted rate of land degradation caused through different land management practices for each land type,
- iii) the expected benefit and cost (both economic and environmental) of implementing one of the above options.

The decision making support system would ideally be linked with the PMP process.

Recommendation 5.16

That NRE develop a decision making support system that can be linked to Property Management Planning, and will assist landowners to implement an efficient and cost effective land management option for drought.

6. ACKNOWLEDGMENTS

The authors would like to sincerely thank the NRE Drought Coordination Group for their assistance in preparing this drought report. The Group members were:

Steve Erlandsen	Mildura (CALM),
Peter Berg	Horsham (CALM),
Clem Sturmfels	Ararat(CALM),
John Boadle	St Arnaud (CALM),
Bruce Radford	Broadford (CALM),
Ross Williamson	Frankston (CALM),
John Price	Bendigo (CALM media),
Greg Bell	Geelong (CALM),
Laurie Norman	Bairnsdale CALM),.
Peter Dixon	Hamilton (CALM,
Kevin Ritchie	(National Parks),
John Cooke	(Flora, Fauna & Fisheries).
Bernie Robb	Charlton (CALM)
Geoff Winsell	Charlton (CALM)

7. REFERENCES

Agriculture Victoria (1995) 'Drought Information Services.' Government Printer.

Agriculture Victoria (1994) 'Drought policy reform in Victoria.' unpublished paper.

Bureau of Meteorology (1994) 'Annual Climate Summary 1994.' Department of Environment, Sport and Territories.

Bureau of Meteorology (1995) 'Annual Climate Summary 1995.' Department of Environment, Sport and Territories.

Cahill, D (1989) 'Drought preparedness - whose responsibility?' Briefing notes for the Land Protection Council, unpublished paper.

Department of Conservation and Environment 'Drought Management Plan for Victoria's water resources.'

Department of Natural Resources and Environment (1994/95) Regional Drought Reports, unpublished reports.

Moran, R. (1994) 'Emergency water supplies in drought' Water Resources Management Branch, Department of Natural Resources and Environment, unpublished report.

Soil Conservation Authority (1984) 'The 1982/83 Drought: Its effects and the Soil Conservation Authority's Actions'.

State Drought Advisory Committee (1994/95) Minutes of meetings, unpublished minutes.

Williamson, 1996. A review of CNR's Involvement in the Farm\$mart Program. Land Protection Branch unpublished report.

APPENDIX 1. 1982/83 DROUGHT

1.1 Climatic conditions during the 1982/83 drought.

The severity and extent of the 1982/83 drought made it possibly the worst drought in this century. The Bureau of Meteorology had established that serious rainfall deficiencies had occurred over much of Victoria, New South Wales, Queensland and Tasmania by the end of August 1982. At the end of December 1982, central/eastern New South Wales, northern Victoria and South Australia recorded the lowest ever recorded rainfalls over the period April to December 1982.

In addition, the coupling of severe rainfall deficiencies and unusually severe frosts, lead to minimal vegetation growth and a shortage of stock fodder during the growing season.

Every municipality, with the exception of Upper Yarra, was declared drought stricken by March 1983. Serious soil erosion occurred over much of the Victoria, however the worst conditions were present north of the Divide. Wind erosion occurred over approximately 2,000,000 ha in Victoria, nearly 1,000,000 ha was affected in the Mallee alone. Water erosion also occurred during intermittent but intense storm activity in the south-east, north-east and northern regions of Victoria.

Farm water storage's such as farm dams began to dry up as early as October 1982, while dams less than 3 metres deep were dry by March 1983. In some areas, intense rainfall events led to siltation and eutrophication in farm dams. Domestic water storage levels were also significantly reduced, with some minor storage's completely discharged.

2.2 1982/83 Drought - Lessons learned by the Soil Conservation Authority.

This section summarises the major drought management issues faced by the Soil Conservation Authority (SCA) in 1982/83. It also highlights management recommendations made in the 1982/83 SCA Drought Report.

Drought Prediction and Preparedness

Early prediction of the onset of a major drought was seen as crucial to setting up a successful framework for coordinating land and water conservation services during drought.

The SCA reacted slowly with the onset of drought. Major lines of communication and extension programs were established during the drought, rather than the period preceding full scale drought conditions. The effectiveness of SCA programs and activities were therefore limited in their success.

It was recommended that a procedure for quickly assessing current conditions in a developing drought was required. However, no significant action was undertaken by NRE to develop a method for forecasting drought conditions, or to monitor conditions during a drought.

Government Policy

There were no Government policies regarding drought, only a range of subsidies and concessional loans offered on a shared basis between the Commonwealth and State Governments (refer to section 4).

There was an early recognition by SCA officers that the existing subsidies were reducing the effectiveness of land and water conservation programs during drought.

The inadequacies in Government policy were identified during a Commonwealth review of drought policy which led to the development of the 1992 National Drought Policy.

Agency Drought Coordination

The Department of Agriculture was the lead agency during the 1982/83 drought. A State Drought Advisory Committee was established during the drought to coordinate various agencies involved in drought management.

Difficulties arose between SCA and Department of Agriculture officers when providing technical advice to the community. Conflicting advice was given by the departments in regard to a number of issues (eg. de-stocking versus opening the gates) which resulted in friction between departments and confusion at the community level.

It was recommended by the SCA that the State Drought Committee be responsible for resolving these technical issues in the future.

SCA Internal Communication

There was a perceived lack of communication between head office and regional staff during the drought.

Delegation of staff and level of autonomy in decision making were major concerns to the SCA. The appointment of a drought coordinator was a positive step in establishing a focus for communication from head office through to regions. Improved communication of drought management strategies and transfer of technical information were central to the SCA drought response.

The SCA received unprecedented media coverage due to the drought. Unfortunately, the media was not well utilised in some regions. The important transition from drought awareness to promotion of drought management practices was

poorly handled. A media liaison officer would have enabled a more informative and strategic media campaign to run throughout the drought.

Staff Training and Experience

The lack of experienced staff restricted the ability of the SCA to encourage adoption of drought management techniques. It was difficult for inexperienced staff to get sufficient credibility to be effective. New problems arose out of the severity of the drought, so a steep learning curve was required from staff with little experience of drought. Success in achieving adoption, usually occurred where there were experienced SCA staff, proven drought management techniques, and a successful extension program. Even with the above, adoption was not successful until farmers were ready to listen. This was also common amongst farmers who could remember the 1940's drought.

It was recommended that a method for rapidly disseminating technical information to staff was needed to raise drought management expertise prior to drought.

Extension

Drought extension activities were widespread and focused primarily upon drought awareness and the adoption of drought management practices.

The use of the media was successful in highlighting the impact of the 1982/83 drought. Television, radio and print media were well utilised to heighten public awareness of the drought. Media was less effective in encouraging farmers to adopt a number of drought management activities.

Field days, demonstrations and landholder meetings were held across most parts of the State. However, these actions were not overly successful in encouraging farmers to adopt drought management practices.

The majority of farmers who adopted drought management practices were those who approached or specifically asked for assistance in managing drought on their property.

There were two major deficiencies in the SCA extension program; the slow response to the drought, and inexperienced staff promoting drought management techniques.

The slow response by the SCA to the onset of the drought meant that although a successful media awareness campaign was run, few areas managed to encourage farmers to adopt drought management activities before the drought ended.

It was evident that practical and successful control techniques were important to extension programs. Experienced regional staff with proven drought strategies could commence their extension programs early in the drought and then progress to the adoption phase.

APPENDIX 2. SUMMARY OF STATUS (AS AT 1 JUNE 1995) OF RECOMMENDATIONS ON EMERGENCY WATER SUPPLIES

<i>Topic</i>	<i>Recommendation</i>	<i>Status</i>	<i>Outstanding Action</i>
A	PREPARATION FOR DROUGHT		
Preparedness of Urban Water Authorities	2. Notify regional water authorities re preparedness of component systems.	Complete - authorities to complete Drought Response Plans for all systems by 31 Dec. 1995.	Collection and review of outstanding Drought Response Plans.
Policy Development	15. Review past assistance measures, criteria and processes and develop detailed policies.	Some assistance policies developed during 1994/95.	Desirable to further review and develop assistance policies, eligibility criteria and administrative processes for use in future droughts
	24. Develop policy for Ministerial intervention in qualifying rights to water.	Underway. BE process will largely define sharing arrangements.	To be completed.
Protection of Environmental Values	23. RWA's to consult with CNR regions in developing rostering strategies for unregulated streams.	RWA's advised.	RWA's to formalise Stream Management Plans for priority streams.
Status Reporting	16. Reporting by CNR Drought Coordination Group on the state of farm storage's to continue	Seasonal condition reports, including details on the condition of farm dams, provided by CNR to DA on regular basis.	
	17. Fortnightly streamflow status reports for State to be prepared.	HydroTechnology contracted to prepare fortnightly reports.	
	18. Monthly groundwater status reports for State to be prepared	HydroTechnology contracted to prepare monthly reports.	
	20. RWA's to report on restrictions imposed on unregulated streams	RWA's advised. Full participation by Goulburn-Murray and Gippsland RWA's.	
	21. Reporting of status of urban restrictions	CNR surveyed status of restrictions in late Feb. and late May.	
Location of Groundwater Bores	7. Clarification of status of emergency groundwater bores in priority areas	Investigation (by RWC/RWA's) completed and final report prepared.	

APPENDIX 2. SUMMARY OF STATUS (AS AT 1 JUNE 1995) OF RECOMMENDATIONS ON EMERGENCY WATER SUPPLIES (Cont)

<i>Topic</i>	<i>Recommendation</i>	<i>Status</i>	<i>Outstanding Action</i>
	8. Assessment of suitability of unused State-owned observation bores for emergency supplies.	Drought not severe enough to warrant this. To be incorporated into the GSC Asset Management Plan for bores.	
Other	3. Minister for Natural Resources to write to RWA'S re responsibilities for emergency groundwater supplies.	Formal involvement of RWA's not necessary.	
	22. Minister for Local Govt. to write to authorities operating under the Local Govt. Act.	Not necessary. Local Govt. systems being incorporated into new Regional Water Authorities.	
Funding of Preparatory Measures	19. Status reporting - existing contract funds to be supplemented by Govt. drought assistance	Costs (\$13,500) met from internal CNR budgets.	
	9. Investigation of emergency bores to be funded by Govt. drought assistance (\$50,000)	Costs (\$30,000) met from internal CNR budgets.	
B.	FUNDING AND COORDINATION OF EMERGENCY WATER SUPPLY ASSISTANCE		
Urban Reticulated Supplies	1. SDAC to note that urban water authorities expected to be self-sufficient in drought	SDAC noted. Urban authorities aware of this expectation.	
Stock and Domestic Supplies	4. RWA's to coordinate emergency bores; State and Local Govt. to contribute 50% of bore cost or connection costs to reticulated system; State Govt. to reimburse Rural and Urban authorities for administrative costs; Local Govt/user groups to reimburse RWA's if bores not decommissioned; Urban authorities to make water available at volumetric rate	Formal assistance of this nature not implemented.	Desirable to agree upon arrangements for future assistance in exceptional circumstances.
	13. Farmers to be provided with similar Govt. assistance with water cartage as in 82/83	Some assistance with water cartage offered by Govt. to farmers.	Desirable to agree upon arrangements for future assistance in exceptional circumstances.
	14. Local Govt. be reimbursed by Govt. for cartage of domestic supplies	Formal assistance of this nature not implemented.	Desirable to agree upon arrangements for future assistance in exceptional circumstances.

APPENDIX 2. SUMMARY OF STATUS (AS AT 1 JUNE 1995) OF RECOMMENDATIONS ON EMERGENCY WATER SUPPLIES (Cont)

<i>Topic</i>	<i>Recommendation</i>	<i>Status</i>	<i>Outstanding Action</i>
C.	GROUNDWATER ADMINISTRATION		
	5. Administrative aspects to be handled by RWA's; technical queries to go to RWA's and/or HydroTechnology	Arrangements satisfactory.	
	6. Additional staff to be made available for responding to queries and funded by Govt. drought assistance.	Drought not severe enough to necessitate additional staffing.	
	10. RWA's to be responsible for coordinating emergency groundwater bores	RWA's agreed in principle to this role.	Desirable to formalise arrangements for future drought events.
	11. State Groundwater Council to prioritise Govt. funded drilling in a severe drought	Drought not severe enough to necessitate State-wide coordination. Council not yet formed.	Desirable to formalise arrangements for future drought events.
	12. SDAC to note that existing arrangements for managing groundwater extraction are appropriate - i.e. RWA's resolve local problems; RWA's + Groundwater Regulatory Unit to identify potential problems; Regulatory Unit to ensure proper management of resource.	SDAC noted - arrangements satisfactory.	Groundwater Regulatory Unit to be transferred to CNR on July 1 1995.

Source : Moran R, (1994)

APPENDIX 3.

GUIDELINES FOR STOCK CONTAINMENT AREAS

The biggest factor affecting property damage during dry periods is the amount of vegetative cover retained to protect the soil. The value of removing stock from vulnerable areas during such times cannot be over-estimated. Grazing and trafficking by stock can quickly reduce the cover to levels which let wind erosion start. One of the best ways of keeping vegetative cover from falling to critical levels is to remove stock from normal paddocks and 'feedlot' them instead in a carefully selected part of the property.

It is important to act early as unconfined grazing and trampling will put considerable stress on land already in a vulnerable state. If vegetation is removed so that only about one third of the soil remains covered then wind will start blowing soil particles away. Trampling will aggravate the situation. Further, the land will then be predisposed to water erosion problems when the rain returns.

Benefits of Stock Containment

- Protection of vegetative cover on majority of property
- Less stress on flora and fauna values of the property
- Facilitation of stock feeding, watering, monitoring and handling.
- Control of shelter and shade
- Better control of weed contamination associated with imported feed.

What is a Stock Containment Area?

A carefully selected part of the property which is set up to hold, feed and water core farm stock during adverse weather periods. It should be considered as part of the property management plan and once established should be maintained and be available for use during emergencies.

What is needed?

- A minimum area of 5 square metres per sheep and 15 square metres per beast.
- Reliable fencing.
- Appropriate subdivision to separate different classes of stock.
- Watering troughs with a reliable reticulated supply of water.
- Stabilisation of soil around troughs through the use of stone or gravel where necessary.
- Troughs located in the open away from stock camping areas.

- Trees guarded, or provision made to replace them when damaged.
- Vehicle access for feeding and stock movement.
- 500 sheep constitute a desirable working number for animal welfare and husbandry reasons. The establishment of a second area may be necessary in some circumstances.

Where should it be?

- Readily accessible to homestead.
- In the lee of shelter.
- On moderately sloping, well drained, stable soils such as a clay or clay loam.
- Not in important areas of remnant vegetation as irreversible damage may result.
- Where problems of noise and smell will be minimised.

Other Issues

Water quality needs to be protected through one or more of the following methods:

- The Stock Containment Area should be setback from watercourses and water storage's. A distance of 500 metres is desirable if no other management methods are to be used in combination with the setback
- A nutrient filter should be established on the down slope side of the Stock Containment Area. The filter may be provided by a vegetation buffer strip, or by constructing traps from wire netting or straw bales.
- Landholders are being encouraged to develop and utilise stock containment areas by the Department of Natural Resources and Environment who will contribute to the cost of fencing and water reticulation up to a maximum of \$1000 per Stock Containment Area.

It is important to closely monitor animals during the period of containment.

Checklist

1. Water. Supply of clean cool water supplied by trough Plan for an average of 6 litre/day/ sheep and 50 litre/day per beast.
2. Area: To a minimum of 5sq m per sheep and 15sq m per beast.
3. Feed Trough Length: 15 cm per sheep, 25 - 45 cm per beast, depending on age and size.

4. Slope and Soil Type. Moderately sloping land with well drained and stable soils such as a clay or clay loam.
5. Odour and Noise. Some isolation is necessary. Access. For feeding, watering, monitoring and getting stock in and out.
6. Loading Ramp.
7. Shade. Cool sheep will drink less and be less stressed.
8. Runoff. Consider where runoff will go from the site. What are your options for avoiding contamination of off-site water quality.
9. Fencing.
10. Subdivision. For separating different classes of stock including shy feeders.

(Compiled by Greg Bell, Peter Berg , David Cummings, Catchment and Land Management Division, CNR.)

APPENDIX 4. MONITORING PROFORMAS AND PROTOCOLS



Department of Natural Resources and Environment

On Farm Drought Monitoring Kit

Dry periods are part of the make up of the Australian environment. Damage to your natural resources such as soil and water can occur during droughts if inappropriate management practices are used. Often, the damaging aspects of drought go unnoticed due to reasonable crops and pastures in the year that the drought breaks. However, yield reductions due to the loss of nutrients and organic matter by soil erosion can last for many years.

The costs of replacing nutrients is also high. For example, with every 1 mm of topsoil eroded per ha, approximately 13 t/ha of topsoil, 130 kg/ha of organic matter are lost. In addition, 20 kg/ha of nitrogen equivalent to 40 kg/ha of urea (\$20 ha) and 8 kg/ha of phosphorous equivalent to 100 kg/ha of superphosphate (\$28 ha). These are only two of the nutrients that will have to be replaced to maintain productivity and this is only for 1 mm of soil eroded.

When droughts do occur, land managers need to be able to manage the land to minimise land and water degradation and maximise the chance for a rapid return to productivity. Monitoring and assessment of the land and water status during such periods is essential for proper evaluation and decision making. Monitoring and assessment will assist in providing you the best management strategies to logically work through this drought and to prepare for the next.

The On Farm Drought Monitor Kit presents a scheme for recording the condition of paddocks and dams on your property. A paddock report will be returned to you at the completion providing information on;

- the effectiveness of your paddock management in minimising soil loss and surface organic matter,
- the rate of change in paddock conditions,
- a photographic and verbal record of paddock conditions,
- an estimate of the rate of water removal from selected dams,
- the most successful paddock management strategies during the drought.

The idea of the Kit is for you to make observations, take photographs and take simple measurements of the conditions on your property for the duration of the drought. Most of the observations can be simply made. **You can choose to monitor a number of paddocks or just one.** The intensity of monitoring is up to you. Information collected will assist you

in planning for the next drought, so the more paddocks you monitor, the more information you will get back.

How to use the Kit

The Kit is divided into five Monitors.

1. **Farm Monitor** Property reference and rainfall recorder.
2. **Paddock Monitor** Information on past and current paddock management and general paddock conditions over the drought.
3. **Erosion Monitor** Detailed assessment of groundcover and erosion levels as the drought progresses. Used if groundcover levels are or fall below 30% or 50%.
4. **Photo Monitor** Record keeping for photographs taken throughout the drought.
5. **Dam Monitor** Estimation of water quantity changes throughout the drought

You do not need to undertake all of the monitors, the choice is yours, however Monitor 1(Farm Monitor) needs to be completed if you undertake any other Monitor, and Monitor 3 (Erosion Monitor) needs to be completed in conjunction with Monitor 2 (Paddock Monitor). Monitor 3 (Erosion Monitor) need only be completed if paddock groundcover levels (as estimated in Monitor 2) fall below 30% on heavier soils and 50% on lighter soils. The number of paddocks to be monitored is up to you, however a minimum of two paddocks with different management histories is recommended to provide you with comparative feedback. At the completion of monitoring, the Kit should be returned and a paddock report will be prepared and returned to you with your observations, estimates of soil loss, water removal and comments.

Instructions for completing the various sections are included with each Monitor. The Monitors should be self explanatory, but if you do have any questions, contact your local CNR representative for assistance or the On Farm Drought Monitor Hotline on 054 446 777.

What you will need

- Flexible tape measure ie builders tape measure or dress making tape measure
- Steel rod 6 mm diameter, 1 m long, 24 per paddock (Monitor 3)
- Hammer (Monitor 3 & 5)
- Can of fluorescent paint (Monitor 3 & 4)
- Star picket 4 (Monitor 5)
- Camera (Monitor 4)
- Managing for Stubble Retention booklet (Monitor 2,3 & 4)
- Builders string and line level (Monitor 5)

What to do if you have problems completing the Monitors

If you have any problems in completing any Monitor contact your local CNR or Land Care representative or the On Farm Drought Monitor Hotline on 054 446 777.

What to do when you have finished monitoring

Send the completed forms to the address below. Your returns will be compiled and interpreted. Paddock reports will be returned providing information on the effectiveness of management options in maintaining soil and groundcover, and estimated water removal rates.

**On Farm Drought Paddock Monitoring
Centre for Land Protection Research
Department of Natural Resources and Environment
P.O. Box 401 Bendigo 3550**