The South Australian Dairy Industry's Regional Natural Resource Management Action Plan

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Summary

Vision

To ensure South Australian Dairy Farming Systems are Environmentally Responsible, Economically Sustainable and Socially Acceptable

Objectives

Our objectives in management are to ensure that:-

1: No point source pollution leaves Dairy Farms
2: Diffuse source Pollution is minimised
3: Production is optimised for the land & water resources used
4: To be good environmental stewards, ensuring the environment on and off farm is enhanced
5:To assist SA dairy farmers to adapt their farming systems to cope with changes in climate.

The Dairy industry is committed to maintaining our environmental duty of care and will ensure that these objectives are pursued considering climate variability & business risk

Action Summary

- Form strong partnerships with the NRM council, regional boards and government agencies to ensure strategic, policy and implementation issues are identified and addressed.
- Establish regional research programs that identify targets for change on farm.
- Ensure all dairy shed effluent systems are compliant with legislation and strive to achieve worlds' best practice.
- Assess farm NRM performance using the Dairy SAT and strive to continuously improve productivity and reduce off site impacts through training and on farm improvement.
- Ensure all activities are monitored and evaluated to enable active adaptive management resulting in continuous improvement.

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Background

The Dairy Industry across Australia recognises that it must be proactive in addressing NRM issues if the industry is to remain viable and competitive. Dairy Australia initiated a National project ***"Sustaining Our Natural Resources – Dairying for Tomorrow"*** to ensure an integrated approach to environmentally sustainable farm management practices.

In 2001, each Dairy RDP (regional development program, a sub group of Dairy Australia) including Dairy SA developed a Regional Action Plan for Environmental Management (RAP) as part of the Dairying for Tomorrow Program. The plan sought to ensure the future of the Dairy Industry by assisting dairy farmers to be pro-active in developing sustainable management principles. The plan has successfully identified NRM issues and activities across the state that has led to numerous projects by farmers to address these NRM issues.

In 2004, the Dairying for Tomorrow program was funded to establish a group of NRM coordinators that could assist the RDP & farmers to continue to implement projects to address regional NRM issues. The Coordinators were responsible for the review of the RAP at this time.

A rapidly changing NRM framework across Australia including revised federal government funding initiatives and the release of Draft NRM plans across South Australia has led to the need for a further revision of the RAP. This revised document is the result of that review; it seeks to update the existing Dairy Action Plan to incorporate the new NRM framework that exists in SA while also addressing current industry NRM research, development and extension needs, providing industry stakeholders and farmers with a clear direction as they continue to address industry sustainability across South Australia.

Industry Summary

The south Australian Dairy Industry consists of approximately 340 farmers producing 617 million litres of milk a year, (Dairy Authority Annual Report 07/08). Production from the approximately 99 000 cows averages 6218 litres. A significant decease in farmers and production has occurred since the last RAP was developed.

South Australian Regional Statistics

	FARMS				COWS			
	Central Adelaide Hills & Fleurieu	South East	Lower Murray & Lakes	Mid North	Central Adelaide Hills & Fleurieu	South East	Lower Murray & Lakes	Mid North
1995	404	180	176	61	40,423	19,978	27,787	4,550
2004	174	136	106	34	32,447	42,057	31,901	4,730
2005	152	128	92	30	28,776	42,207	28,511	4,874
2008	119	116	69	30	24,542	47818	21009	5845

Source: Dairy Authority of SA & SA Dairy Industry web site & Dairy Authority Annual Report 2007-08

Since 2004/5 the industry has continued to be affected by the drought conditions that have impacted upon large areas of Australia. Reduced feed reserves and high cost of feed resulted in a tendency to reduce cow numbers. In 07-08 milk prices increased significantly even though costs such as fuel, fertiliser and feed also continued to increase enabling some farmers to review production systems and change production practices.
In early 2009 global financial instability has negatively impacted milk price and future milk price outlook. This has significantly shaken farmers confidence once again, farmers are actively reassessing their production systems and reevaluating investment on farm.

Any future industry growth is expected be achieved at a sub regional level and not equally across the State due to the geographic spread of the industry. Increased productivity gains are expected to be implemented by increasing stocking rates, improved genetics, better and more strategic use of fertilisers, more effective use of available water resources and a more intensive use of the available asset base.

The South Australian Dairying Regions

Dairying in South Australia extends over three Regions as follows:

Adelaide Hills & Mid North Region

The Adelaide Hills Region covers diverse high rainfall areas of the Fleurieu Peninsula to the drylands of the Mid North. It is the most intensively settled area of the State. It extends from the coast in the south, to the Barossa Valley in the north and from Adelaide in the west, to the Mt Lofty Ranges in the east. It covers an area of more than 4000 km^2 of which approximately 16000 ha is used for dairying. It accounts for 36% of farms and 24% of cow numbers.

The region has a long history of water resource development and has always been an important water supply catchment for Adelaide. The relatively high rainfall (450 to 900mm) and the numerous rivers and streams have led to the construction of eight large storage reservoirs to harvest the water resource and supply Adelaide with drinking water. This is augmented by water from the River Murray, but water collected within the Mount Lofty Ranges catchment contributes a significant component (60% in an average year) of the total supply needs of Adelaide.

Both surface water and groundwater are used for irrigation, stock and domestic supply. While much of the Mount Lofty Ranges is within the Adelaide watershed, with surface water required for Adelaide's water supply, the requirements of rural users must also be met.

Problems associated with water-borne pathogens, which can cause gastrointestinal illness, and the detection of low level pesticide contamination of some of the supply reservoirs, have focused attention on the need to be vigilant in the protection of our water supply catchments.

Nutrients from urban and rural sources can run off into rivers and streams and enter water supply reservoirs where they can lead to the development of algal blooms. Faecal contamination from animals and poorly constructed or maintained septic tanks can also cause problems.

Many pressures have impacted on water quantity, resulting in reduced flows and catchment and groundwater yields. These pressures impact on flow regimes and the subsequent ecological sustainability of the riverine and associated aquatic ecosystems.

Water resources in both the Eastern and Western Mt Loftys have been proclaimed and water users have been required to identify the existing levels of use. Each sub region will now progress to the development of water allocation plans that will establish the capacity of the resource lead to the assignment of sustainable allocations.

Impact of recent climate variability

Farms in the Mt Lofty Ranges have been impacted by drought, and reduced surface and groundwater availability and increased summer temperatures over the past few seasons.

Drought has reduced the farm capacity to grow fodder and has increased the costs associated with purchasing feed.

Reduced surface and groundwater availability has impacted on the ability of many farms to supply dairy washdown and stock water whilst decreasing groundwater availability has led to stronger water allocation policy that is likely to reduce water allocations on farm.

The increased number of extreme weather events particularly hot days in summer has resulted in increased the amount of time when heat stress is an issue that farmers must manage.

Future NRM Issues for the Mt Lofty's and Mid North

The major challenge facing the Dairy Industry in the Adelaide Hills and Mid-North is the ability to develop water management strategies that do not contribute to further degradation but in fact improve water quality, whilst ensuring the industry remains economically viable. The dairy industry has been actively involved in community consultation on the development of regional water allocation plans. It is expected that farms will be required to meter water use and may experience reduced availability of water for both irrigation and industrial uses on farm.

Farms in the region will also continue to be required to ensure that the quality of water leaving the farm is not degraded. Fencing of riparian areas and management of stock to reduce access to watercourses will continue to be a focus in the Mt Lofty Watershed.

Production of forage in dryland areas with reduced rainfall will also challenge farmers to examine alternative and improved practices.

Changes to livestock management to reduce the impact of extreme weather events particularly hot days will also be required.

Lower Murray and Lakes Region

The Lower Murray and Lakes Region comprises of the southern end of the Murray Darling Basin from Mannum to the coast. The area is the source of two main water pipelines, which supply up to 90% of Adelaide's water in dry years. They are located between Mannum and Murray Bridge in the northern part of

the region and the intake for the water supply for the Upper South East Region is at Tailem Bend. The quality of the water in this region is therefore of critical importance to South Australia.

The recent drought in the Murray Darling Basin has had a massive impact on the irrigated farms surrounding the Lakes and more recently is now also impacting on the farms in the Lower Murray. Initially the Lakes farms were decimated by low lake levels and high water salinities that prevented irrigation water use and reduced the availability of stock and domestic water supplies. By 2008 the water level in the Lock 1 pool had continued to drop and many farmers in the Lower Murray were also having difficulty accessing irrigation water, it is expected that in 2009 water levels in the Lower Murray will decline to a level where many farms need to undertake infrastructure improvements to access stock and domestic supplies. At the end of December 2008 salinities at Mannum, Murray Bridge, Milang and Meningie were 760, 710, 4500, 7400 Ce respectively and water level was at -0.6m AHD (down from normal pool of +0.75m AHD). Concurrenlty with reducing accessability water allocations available for use have also been significantly reduced and salinities continue to climb. In December 2008 allocations to the region were 15% of entitlement.

The region includes 69 dairy farms, of which 46 are located on reclaimed swamps and river flats between Mannum and Wellington. The balance is located adjacent to the lakes and on the Narrung Peninsula. In total, the region accounts for about 21% of the farms and cows in South Australia.

The Lower Murray Irrigation Area and Lower Lakes constitute two different environments with significantly different NRM histories that are described separately below.

Lower Murray Irrigation Area

The Lower Murray Irrigation Area consists of 23 reclaimed swamps (13 used for dairying), comprising of approximately 5000 hectares, developed as flood irrigated pasture between the late 1800's and 1950's. The Swamps are located along approximately 80 kilometers of floodplain on the River Murray between Mannum and Wellington.

Irrigation of the Lower Murray Reclaimed Irrigation Areas for dairy production while providing a positive social and economic benefit to the region also results in some degradation of the local and riverine environment.

Irrigation water diversions within the Lower Murray Reclaimed Reclaimed Irrigation Areas have been estimated to range between 60 and 305 GL/year. The current cap on diversions for the Lower Murray is approximately 99GL.

Irrigation drainage water from the area has previously largely disposed of through return to the River Murray. This has had a direct impact on water

quality in the River. Records from the former Engineering & Water Supply (now SA Water) indicate that about 80,000ML of surface and sub surface drainage water is pumped into the River Murray annually. This drainage volume also includes intercepted groundwater and stormwater (Whittle & Philcox, 1996). Improving irrigation efficiency can reduce drainage water return to the river.

The regional program of infrastructure works including, metering of diversions, rehabilitation commenced in 2005, this program planned to enable farmers in this region to achieve 2 prime objectives:

- Metering of water diversions and compliance with water allocations
- Capture and reuse on farm of all surface water runoff

Significantly reducing the impact of farming in this region on the River Murray. At the end of December 2008 over 90% of mandatory works were complete with remaining mandatory works to be completed within two months.

Impact of recent climate variability

In December 2008 extractions of water from the River Murray were restricted to 15% of allocation, this restriction and the threat of further restrictions in coming irrigation years has lead many farmers in the region to consider trading water and conversion from permanent pasture production to opportunistic cropping of the swamps combined with feedlotting of cows.

While the irrigation infrastructure works continued due to contractual obligations much of the infrastructure has not been utilised due to irrigation water restrictions and reduced water access. Farmers in the region who have continued to dairy have reduced their reliance on permanent pasture and moved to intensive feeding systems utilising either bought in feeds or fodder from dryland.

Dryland cropping in the region has also been affected by lower than average rainfall over the past few years. This has impacted the Lower Murray dairy businesses through reduced capacity to produce fodder on farm and higher prices for bought in feed.

Future NRM Issues for the Lower Murray

Future NRM issues and activities are likely to include setup and management of intensive feeding systems and land management of previously permanent pasture areas now retired or partially irrigated for annual pasture production.

The River Murray Natural Resource Management Board has commenced a project to conduct a Phase A Land and Water Management Plan review for the district and preliminary research into startup irrigation for the first half of 2009 that will lead to a better understanding of the needs of land managers remaining in the district.

As farms in the Lower Murray adopt more intensive feeding systems they will be required to manage the impacts of feed out areas including effluent management and diffuse pollution.

Lower Lakes

The dairy industry on the Lower Lakes consists of approximately 5500ha of predominantly dryland dairy farming around Narrung and Meningie.

The district as a whole, experiences hot dry summers and mild, wet winters. Average annual rainfall in the Narrung and Meningie area ranges from 400 to 500mm (Australian Bureau of Meteorology). Rainfall occurs predominantly during the winter season, with 70% falling from April to October. The “seasonal break” can vary from March to June, with the average being around the second week of May. Average annual evaporation ranges from 1500 -1800mm.

The district is largely a coastal plain with overlying calcareous coastal dunes. These dunes trend north-west and south-east and are usually between 10-30m above sea level. Most sands are slightly acidic in the surface to neutral or slightly alkaline at depth.

Because of the permeable nature of the mostly sandy soils, there is very little surface drainage throughout most of the area. Groundwater in the region includes a confined and an unconfined aquifer and is part of the groundwater system of the Murray Darling Basin. From the high rainfall areas in Western Victoria and the South East of South Australia, groundwater moves slowly in a westerly direction. Natural discharge from the system occurs to the Lakes, the Coorong or low-lying saline areas. Salinity levels of the watertable reach up to 3000mg/l in the confined aquifers and are generally unsuitable for irrigation.

Impact of recent climate variability

Irrigated farmers within the district have had to either significantly reduce or cease irrigation during the drought and many have only been able to remain in dairy production by carting stock and domestic supplies by tanker prior to connection to mains supply in late 2008 early 2009.

The change from partially irrigated to almost 100% dryland dairying has seen many of the regions remaining farmers seeking information on low input, biological and biodynamic farming options in order to reduce the cost of production.

Future NRM Issues for the Lower Lakes

Future NRM issues and activities are likely to include the continuation of fencing and revegetation works around Lakes Alexandrina and Albert, these

works are an action of the “Coorong, Lower Lakes and Murray Mouth: Directions for a Healthy Future” document.

Farmers in the region have highlighted that they are considering options to undertake aspect of organic and biodynamic production or are in the process of converting enterprises to these systems.

Ensuring that there is a comprehensive understanding of the offsite impacts of production in this region will continue to be of importance.

South East Region

The South East Region extends from the coast south of Mt Gambier north to Bordertown and west to Robe. Approximately 20 000 ha is farmed for dairy in the region. It is generally divided into two sub-regions: The upper and Lower South East, the Lower South East includes 105 dairy farms and there are 11 farms in the Upper South East (Dairy Authority 2008). In total, the South East region accounts for about 35% of the farms in South Australia.

Lower South East

The Lower South East comprises dunes with the low-lying land between the dunes often subjected to surface flooding and waterlogging. The tendency for the area to be waterlogged has led to extensive drainage schemes.

Rainfall decreases from around 750 mm per year in the south to around 600mm in the north. Evaporation is low (< 1600 mm/year) throughout the region. However a large proportion of the dairies in the region utilise irrigation to ensure optimal pasture production.

There are extensive high productivity groundwater aquifers in the region with generally high quality groundwater (<1500 mg/L) although salinity levels are reported to be rising and in some areas there are problems with nitrate contamination. Although there is unused capacity in the confined aquifer groundwater reserves of the Lower South East, Government policy aims to ensure that any further development is sustainable and that present irrigation practices are improved to increase the efficiency of water use. Water resources in this region are prescribed and water allocation plans are being developed and implemented.

There has been contamination of the groundwater with nitrates and other pollutants mainly caused by inappropriate effluent disposal methods. There has also been contamination with soil nitrates resulting from the inappropriate use of fertilisers.

Upper South East

The Upper South East extends north from about Naracoorte and includes a number of dairies around Bordertown and Tintinara.

The groundwater resources of the region are highly valued and used primarily for irrigation of horticultural crops, seed and hay production and some pastures.

Water from unconfined (or watertable) aquifers is easily accessible (< 10 m in most low-lying areas) and used extensively. These aquifers are recharged by local rainfall. Water from the confined aquifer originates in Victoria and the South East and is deeper (>50 m) but generally of low salinity (600 - 3000 mg/L).

In most areas groundwater is sub-artesian but between Lucindale and the coast it is artesian and thus easily accessible and used to irrigate pastures. Water from the confined aquifer is not directly recharged by rainfall but in part from the watertable and mainly through specific recharge areas. Recent groundwater investigations in the region are beginning to identify these areas.

In the Upper South East the water used for irrigation comes from unconfined aquifers, which tend to be more saline. Irrigation inevitably increases the salinity of the groundwater and in some areas increased use of this resource has led to significant increases in salinity.

Impact of recent climate variability

The South East has experienced unusually dry conditions over the past few years, the lower rainfall resulting in reduced dryland pasture production and increased reliance on irrigation. The dry conditions have also seen an increased incidence of frosts.

Future NRM Issues for the South East

The SE NRM Board is currently reviewing the South East Water Allocation Plans and consultation on the draft document has highlighted that in many areas groundwater extraction levels are unsustainable. The conversion to volumetric allocation will see many irrigators allocations reduced. Improving water use efficiency on irrigated properties will be essential.

The potential for contamination of groundwater by dairy shed effluent and diffuse source pollution will also continue to be a high priority issues in the future. There appears to be potential to reduce GHG emissions and potential for groundwater contamination by nitrates through the use of Urease inhibitors in the region and this needs to be explored.

SA Dairy Industry Structures

Dairy Industry

Dairy SA

DairySA is a joint venture with Dairy Australia that exists specifically to benefit dairy farmers in South Australia.

It has been operating since 1992 (initially as READD) to develop a strategic direction for dairy research, development and extension in the region. It sets priorities, seeks submissions for, and commissions dairy improvement projects.

SADA

The South Australian Dairyfarmers' Association (SADA) is the peak body for South Australian dairy farmers. SADA is a member of Australian Dairy Farmers Ltd and are affiliated with the National Farmers Federation.

SADA represents dairy farmers on a range of issues, including NRM, to state and local government, the dairy industry and the wider community.

As a member-based organisation, SADA maintains a network of regional branches setting policy agenda for the dairy industry in South Australia.

South Australian Dairy Industry Development Board

The South Australian Dairy Industry Development Board was established to provide strategic leadership and advice to the Government about the SA dairy industry. It provides a forum for each of the major stakeholder groups in the South Australian dairy sector to develop initiatives which contribute to the future development of the industry in the State's dairying regions.

The Boards Draft Plan 2009 highlights consumer demand for environmental sustainability as a key driver for dairy businesses in the state to adopt sustainable production practices.

The proposed strategies that need to be considered by this document include

- Continued involvement in regional NRM
- Continue to omprove pasture quality, management and utilization.
- Ensure strong linkages and participation within National Climate Change and Variability Programs
- Have consistent input into climate variability policy of government and industry.

South Australian NRM Structure

South Australia has a comprehensive and integrated approach to natural resource management. The *Natural Resources Management Act 2004* (NRM) brings together legislation covering soil, water, landscapes, marine environments, native vegetation and animals and ecosystems.

Under the Act, the statewide NRM Council and eight regional NRM boards are building on the work previously undertaken by more than 70 boards and groups across the state.

The NRM Council is responsible for the State NRM Plan. This plan will provide for the implementation of the goals and objectives of the state plan while also meeting the needs for a sustainable industry future.

This Dairy Industry regional action plan will contribute to delivering the four goals of the State plan as demonstrated in the table below.

Dairy RAP	**SA NRM Plan Goals**			
Objectives	Landscape scale management that maintains healthy natural systems and is adaptive to climate change	Prosperous communities and industries using and managing natural resources within ecologically sustainable limits	Communities, governments and industries with the capability, commitment and connections to manage natural resources in a sustainable way	Integrated management of biological threats to minimise risks to natural systems, communities and industry
No point source pollution leaves Dairy Farms	✓			
Diffuse source Pollution is minimised	✓	✓		
Production is optimised for the land & water resources used	✓	✓		✓
To be good environmental stewards, ensuring the environment on and off farm is enhanced	✓		✓	✓
To assist SA dairy farmers to adapt their farming	✓	✓	✓	

systems to cope with changes in climate.				

South Australia's dairy industry falls within the jurisdictions of 4 NRM boards:

- Adelaide and Mount Lofty Ranges
- Northern and Yorke
- South Australian Murray Darling Basin
- South East

Each NRM Board initially adopted interim NRM plans developed by their precursor organisations and are currently consulting on or have completed new NRM plans for the region. The Strategies in this Dairy Regional Action Plan are related to the Management Action Targets and Resource Condition Targets from the most current plan or investment strategy in order to demonstrate how implementation of this plan will deliver the outcomes required by regional NRM boards.

NRM Issues

The NRM issues facing the dairy industry in South Australia are generally consistent across sub regions, however the priority placed on these issues in each sub region varies.

To enable the industry to broadly recognise NRM issues that it faces while also enabling sub-regional groups to target priorities within their own areas this plan seeks to highlight all issues while also providing a structure for on-ground action that allows for local prioritisation.

Following the identification of key NRM issues by the Regional Action Plans developed in 2001 the dairy industry has established a comprehensive range of farm best management practices. These BMP's have been complied into a resource toolkit called the Dairy SAT (Dairy Self Assessment Tool). Dairying for tomorrow is now implementing the Dairy SAT across Australia providing facilitators to assist farmers to identify their current level of NRM performance against the industry's expectations.

The NRM issues addressed by the Dairy SAT Best management practices and the outcomes achieved by implementing BMP's are detailed in the following table:

NRM Issue	Dairy SAT BMP	Impact of BMP	NRM Outcome	Economic Importance to Farm	Industry Priority
Water quality Water quantity Nutrient losses	**Effluent Management**	Improved water quality Efficient use and recycling of water Efficient use of nutrients through waste recycling. Improved pasture production Minimisation of point & diffuse source losses of nutrients & pathogens.	Improved water quality Improved land condition Reduced water diversions	Reduced fertiliser requirements Reduced water requirements	High
Water quality Water quantity Nutrient losses Water use efficiency Rising water tables Salinity Waterlogging	**Irrigation**	Improved water quality Efficient use of water. Improved pasture production. Minimisation of point & diffuse source losses of nutrients & pathogens.	Reduced water diversions Improved water quality Improved land condition Reduced Greenhouse gas emissions	Reduced water requirements Reduced energy requirements Optimisation of production	High
Acidification Soil Fertility Diffuse pollution Water quality Algal Blooms	**Nutrients**	Improved water quality. Improved pasture production Improved soil health Minimisation of point & diffuse source losses of nutrients & pathogens.	Improved water quality Improved land condition Reduced greenhouse emissions	Optimisation of fertiliser requirements Optimisation of production	High
Erosion Soil structural decline Dryland salinity Irrigation induced salinity Sodicity Acidification Waterlogging Fertility Water availability	**Soils**	Improved pasture production Improved soil health Minimisation of point & diffuse source losses of nutrients & pathogens. Management of salinity	Improved soil health Improved water quality Reduced greenhouse emissions	Optimisation of fertiliser requirements Optimisation of production	High

NRM Issue	Dairy SAT BMP	Impact of BMP	NRM Outcome	Economic Importance to Farm	Industry Priority
Point source pollution Diffuse losses Residues	**Chemicals**	Reduced chemical costs Management of OHS issues Minimisation of point & diffuse source pollution	Improved soil health Improved water quality	Optimisation of chemical requirements Optimisation of production	Low
General rubbish/wastes Waste milk Dead Stock Odour Noise	**Farm Wastes**	Minimisation of rubbish and waste Minimisation of point & diffuse source pollution. Recycling of resources	Improved air quality Reduced off site impacts	Reduced waste Reduced likelihood of complaints	Low
Weeds Pest Animals	**Pests and Weeds**	Improved pasture production Minimisation of pests and weeds	Improved Land Condition	Optimisation of production	Medium
Loss of Biodiversity Revegetation Stream bank erosion Lakeshore erosion Riparian management Remnant vegetation Biodiversity corridors Heritage	**Biodiversity**	Protection of stock Improved soil health Minimisation of point & diffuse source pollution	Improved water quality Improved riparian stability Enhanced biodiversity value	Optimisation of production	Low
Energy consumption Carbon dioxide emissions Volatilisation of nutrients Greenhouse gasses	**Air & Energy**	Reduced energy costs Minimisation of point & diffuse source pollution	Reduced greenhouse gas	Reduced energy requirements Optimisation of production	Medium

No point source pollution leaves Dairy Farms

Ensure all dairy regions have access to Dairy Shed Effluent Guidelines that provide details of current worlds best practice management of dairy shed effluent by Jan 2007. The Resource not Waste project enabled Dairy SA to review, print and distribute to all dairy farmers a copy of the Dairy Shed Effluent Guidelines for their region in 2008. The guidelines are also available on the SA Dairy Industry website and Dairying for Tomorrow website making them available to any new dairyfarmers who enter the industry.

Provide access to system design assistance to all farmers by 2011. The Resource not Waste project invited all farmers to participate in the on farm technical assistance and system design program. 220 Dairy properties undertook a dairy visit amounting to 60% of properties accessing the assistance as not all farmers wanted to participate some farmes were able to access additional assistance from the project if it was required.

All farmers to have systems achieving targets set in the regional effluent guidelines by 2011.
In 2008 farmers who had participated in the Resource not waste project were surveyed to see what works had been undertaken. 33 properties have constructed a new dairy shed/feed pad effluent management system, or completed upgrades to an existing system. 4 had implemented management practices in order to comply with directions from EPA. 10 were planning to upgrade. 4 were satisfied with their existing EfMS, Therefore the proposed upgrades in their effluent management plan were not considered necessary, unless money became available post drought. 36 farms surveyed had made no progress. The main responses for not making any progress were due to drought, high feed prices, the uncertainty to the finish of the 2007 season and water availability.
It will be important that the industry continues to encourage and assist farmers to ensure that effluent management systems meet and exceed legislative requirements into the future.

Encourage farmers to ensure farm chemicals are appropriately handled to ensure pollution risks are addressed. Farmers participating in Dairy SAT examine their management of chemicals. By 2008 over 50 farmers had completed at least one module of the Dairy SAT. Of those participants 4 identified a need to alter the application of chemicals to meet the industry acceptable practices, 10 identified that they required further training and 25 had concerns about proper storage of chemicals. These issues were added to the Farm Action Plan and led to a number of farm chemical management courses and a farm field day supported by SafeworkSA. However only a small number of farmers have participated in Dairy SAT to date, further work in this area will be required.

Farm Chemical users course to include a dairy specific module by Dec 2007. Many farmers identified that farm chemical management training was only relevant to broad acre croppers and did not identify issues for dairy farms. SADA nominated Monique White the Dairying for Tomorrow coordinator to become a member of the Chemcert (SA) board in order to ensure that farm chemical management training met the needs of the dairy industry. Board membership led to the establishment of partnerships with the training providers to tailor the Chemcert course to a dairy audience and the presentation of a number of courses through SE TAFE and Smith and Georg. Farmers participating in the Dairy SAT continue to identify farm chemical management as an area for further activity. Dairy SA, the NCDEA and Chemcert (SA) will need to establish partnerships to ensure future training meets industry needs.

50% of farmers recycling farm waste by 2010. Farmers participating in Dairy SAT identified that they recycle some farm wastes. A number of farmers requested information on recycling of silage wrap and contacts were provided for them to follow up.

2: Diffuse source Pollution is minimised

Review current information and initiate programs to document environmental impacts in each sub-region using current data by 2007.
The review of impacts was undertaken however it was not possible to quantify the environmental impacts related to dairy farms in each region. Each NRM region had projects in place to address perceived priority risks and Dairying for Tomorrow saught to partner with these projects in order to utilise the results to develop targeted projects for each region. Some of these project are still continuing and will need to be included in future action.

All farmers to have undertaken an environmental self audit such as Dairy SAT by 2009. By 2008 only 50 farmers had participated in Dairy SAT. However further Dairy SAT projects are planned for the South East and Fleurieu, this effort will need to continue to enable all farmers access to the progeam.

At lease one diffuse pollution minimisation project in each dairy sub region by 2008. Multi region projects have included RRR – Reduce, Reuse and Recycle at the Dairy Shed. Development of a Water Use Efficiency and Effluent Application tool.

Production is optimised for the land & water resources used

All farmers to have undertaken an environmental self audit such as Dairy SAT by 2009. Only 50 farmers had completed Dairy SAT by the end of 2008, efforts to increase this level of uptake are required.

All Dairy Australia programs to highlight NRM as well as production outcomes from implementation by 2008. Dairy Australia has undertaken to review the Dairy SAT to incorporate productivity outcomes with the revised version to be available in 2009.

All NRM projects to identify positive farm productivity benefits by 2008. Dairy SA has included farm productivity benefits in each NRM Project.

Farmers implementing best practices on farm. The Dairy SAT program has identified overwhelmingly that wherever possible farmers are implementing best management practices. The responses to the Dairy SAT program have also demonstrated that participants are actively planning a continual improvement program. These efforts must continue to be communicated to a wider audience.

To be good environmental stewards, ensuring the environment on and off farm is enhanced

Remove all young stock from riparian zones by 2010. The Myponga catchment project has demonstrated that BJD management practices have meant that calves in that catchment do not have access to watercourses.

Ensure that adult stock access to riparian zones is managed by fencing by 2010. The Myponga catchment project demonstrated that while most farmers had restricted stock access to riparian zones there were still areas on farm where fencing work was incomplete. In most cases cost, and labour requirements were the major impediment to completing fencing as most farmers recognised that there were significant benefits from managing stock access to streams. However it is expected that in other catchments in the Mt Lofty Ranges and other regions there

would be a lower uptake of fencing of riparian zones due to the lower priority placed on management of riparian zones.

ManaJD program clearly identifies stock management that will reduce pathogen transfer risks by 2008. The program identifies this but it is not currently linked to additional NRM benefits that are achieved by stock management.

At least 50% of remnant vegetation on dairy farms is fenced and managed to enhance biodiversity in those areas by 2010. Many participants in Dairy SAT have identified that they have fenced remnants and revegetated areas on farm, however from the information provided by farmers it is not possible to quantify the area protected.

The Plan 2009 and Beyond

Vision

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Objectives

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NRM Strategies

Objective	Strategy	Complimentary NRM Board Resource Condition Targets
1. No point source pollution leaves dairy farms	1. A: Implement systems to prevent dairy shed effluent leaving the farm 1. B: Ensure farm chemicals are managed to prevent pollution 1. C: Encourage appropriate recycling or disposal of farm wastes to ensure pollution risk is addressed.	SE MAT's **Endorsed for 2008/09 Regional investment Strategy** **Goal A Healthy landscapes supporting high value ecological systems** **Priority 1** Risk-based strategies are developed and implemented to maintain (or improve) the quality of groundwater and surface water (eg stormwater, drains, and effluent) entering wetland, coastal and marine habitats, by 2014 **Goal B Regional communities active in NRM** **Priority 1** B.1 Support for community groups and volunteers, and participation by volunteers in NRM in the Region is increased, by 2014 **Priority 2** B.3 The benefits arising from the management of the region's water, biodiversity, and soil and land resources are acknowledged and supported by the community, by 2014 **Goal C Resilient industries taking responsibility for sustainable use and management of natural resources** **Priority 1** C.1 A total water budget for the Region's water resources is defined, by 2017 C.4 Efficient and sustainable irrigation practices and systems are recommended, demonstrated to, and adopted by 20% of irrigators, by 2014 C.5 Options for improved management, including reuse, of waste water for improved environmental outcomes (e.g. industrial, stormwater, domestic, agricultural) are identified, and management arrangements are developed, by 2014 **Priority 2** C.9 Land is managed for reduced impacts on the soil resource (compaction, subsoil infertility, waterlogging, induced and inherent sodicity, non-wetting soils, and erosion) C.10 By 2017, water use efficiency is improved by 20% due to improved soil physical condition and nutrition (includes reduction in area of non-wetting sands) **Goal D Effective partnerships and good governance for NRM** **Priority 1** D.4 NRM skills and funding resources for the Region are maintained or increased (ongoing) A progressive reduction or maintenance below critical levels in average and peak nutrient loads in surface and groundwater (NYAD NRM) AMLR & SAMDBNRM (updated May 09) SAMDB P1 Community managing natural resources sustainably RCT P1: 80% increase in the number of people managing natural

		resources sustainably by 2030 SAMDB W1 Sustainably manage all water resources RCT: All water resources are managed sustainably by 2018 SAMDB W2 Maintain acceptable water quality RCT: Improve water quality to achieve the regionally endorsed environmental values by 2030. SAMDB A1 Reduce net greenhouse gas emissions RCT: Reduce greenhouse gas emissions in the SA MDB by 60% by 2050 SAMDB A2 NRM in the Region is adaptive to climate variability and climate change RCT: 100% of natural resource managers incorporating climate change adaptation into their forward planning or management by 2030 SAMDB High priority research Smart use of water to gain maximum overall value and increase robustness of systems that rely on water Ecological impacts of different water management strategies in the Eastern MLR AMLR T1 Stormwater and waste water used. 75% of stormwater used 100% of waste water reused AMLR T2 Surface water and groundwater. All water resources meet water quality guidelines to protect defined environmental values AMLR T5 Productive capacity of agriculture. Maintain productive capacity at current levels AMLR T6 Land condition for primary production. Improve land condition by 15% AMLR T10 Land based impacts on coastal, estuarine and marine processes Impacts reduced from current levels AMLR T13 Improve the capacity of people in the community. institutions and regional organisations to sustainably manage our natural resources Increase capacity by 20%
2: Diffuse source pollution is minimised	2. A: Quantify the potential diffuse sources of pollution and their impacts 2. B: Farmers are aware of best practices and sustainable management of all aspects of the farming system 2.C Establish projects	SE MAT's **Endorsed for 2008/09 Regional investment Strategy** **Goal A Healthy landscapes supporting high value ecological systems** **Priority 1** Risk-based strategies are developed and implemented to maintain (or improve) the quality of groundwater and surface water (eg stormwater, drains, and effluent) entering wetland, coastal and marine habitats, by 2014 **Goal B Regional communities active in NRM** **Priority 1** B.1 Support for community groups and volunteers, and participation by volunteers in NRM in the Region is increased, by 2014 **Priority 2** B.3 The benefits arising from the management of the region's water, biodiversity, and soil and land resources are acknowledged and supported by the community, by 2014 **Goal C Resilient industries taking responsibility for sustainable use and management of natural resources** **Priority 1** C.1 A total water budget for the Region's water resources is defined, by 2017 C.4 Efficient and sustainable irrigation practices and systems are recommended, demonstrated to, and adopted by 20% of irrigators, by 2014 C.5 Options for improved management, including reuse, of waste water for improved environmental outcomes (e.g. industrial, stormwater, domestic, agricultural) are identified, and management arrangements are developed, by 2014

	that enable farmers to address diffuse source pollution issues on farm	**Priority 2** C.9 Land is managed for reduced impacts on the soil resource (compaction, subsoil infertility, waterlogging, induced and inherent sodicity, non-wetting soils, and erosion) C.10 By 2017, water use efficiency is improved by 20% due to improved soil physical condition and nutrition (includes reduction in area of non-wetting sands) **Goal D Effective partnerships and good governance for NRM** **Priority 1** D.4 NRM skills and funding resources for the Region are maintained or increased (ongoing) 2.b.2: A progressive reduction or maintenance below critical levels in average and peak nutrient loads in surface and groundwater (NYAD NRM) AMLR & SAMDBNRM (updated May 09) SAMDB P1 Community managing natural resources sustainably RCT P1: 80% increase in the number of people managing natural resources sustainably by 2030 SAMDB P3 Landscapes are planned, developed and managed sustainably RCT P3: All landscape development and management to have a neutral or beneficial impact on natural resources by 2030 SAMDB W1 Sustainably manage all water resources RCT: All water resources are managed sustainably by 2018 SAMDB W2 Maintain acceptable water quality RCT: Improve water quality to achieve the regionally endorsed environmental values by 2030. SAMDB L1 Improve soil and land condition to increase productive capacity RCT: A 10% improvement in soil and land condition from 2008/2009 levels by 2030 SAMDB L2 Reduce the impact of land degradation processes on productive land RCT: The area of land affected by land degradation processes is reduced by 2030 SAMDB A1 Reduce net greenhouse gas emissions RCT: Reduce greenhouse gas emissions in the SA MDB by 60% by 2050 SAMDB A2 NRM in the Region is adaptive to climate variability and climate change RCT: 100% of natural resource managers incorporating climate change adaptation into their forward planning or management by 2030 SAMDB High priority research Integrated salt and water balance in the riverine corridor Smart use of water to gain maximum overall value and increase robustness of systems that rely on water Ecological impacts of different water management strategies in the Eastern MLR More robust production systems Integrated landscape scale modeling and scenario testing

		AMLR T1 Stormwater and waste water used. 75% of stormwater used 100% of waste water reused AMLR T2 Surface water and groundwater. All water resources meet water quality guidelines to protect defined environmental values AMLR T3 Water resources managed within sustainable limits. All water resources used within sustainable yield (allowing for variability) AMLR T5 Productive capacity of agriculture. Maintain productive capacity at current levels AMLR T6 Land condition for primary production. Improve land condition by 15% AMLR T10 Land based impacts on coastal, estuarine and marine processes Impacts reduced from current levels AMLR T13 Improve the capacity of people in the community. institutions and regional organisations to sustainably manage our natural resources Increase capacity by 20%
3. Production is optimised for the land & water resources used	3.A Ensure farmers are aware of current best practices and are able to source further assistance if required. 3.B: Ensure current and future industry training programs demonstrate production optimisation as well as NRM benefits. 3.C: Ensure resources are used in a sustainable manner to optimise farm productivity.	Soils supporting primary production reflecting their optimal capability by 2015 (NYAD NRM) Progressive improvement in the condition, integrity and viability of natural biodiversity and primary production systems, achieved through a progressive decrease in the impact of pest plants, problem animals and diseases with clear targets set by 2010 (NYAD NRM) Achieve improved economic productivity in 50% of primary production lands affected by salinity by 2010 (NYAD NRM) Water regimes restored to a sufficient level to sustain significant dependant ecosystems throughout the region by 2015 (NYAD NRM) Water use is maintained within sustainable limits (NYAD NRM) A progressive reduction or maintenance below critical levels in average and peak nutrient loads (N&P) (NYAD NRM) **MAT's Endorsed for 2008/09 SE Regional investment Strategy** **Goal A Healthy landscapes supporting high value ecological systems** **Priority 1** A.1 By 2014, the condition of vegetation in at least 50 remnant areas is improved by active management A.6 Risk-based strategies are developed and implemented to maintain (or improve) the quality of groundwater and surface water (eg stormwater, drains, and effluent) entering wetland, coastal and marine habitats, by 2014 **Goal B Regional communities active in NRM** **Priority 1** B.1 Support for community groups and volunteers, and participation by volunteers in NRM in the Region is increased, by 2014 **Priority 2** B.3 The benefits arising from the management of the region's water, biodiversity, and soil and land resources are acknowledged and supported by the community, by 2014 **Goal C Resilient industries taking responsibility for sustainable use and management of natural resources**

		Priority 1 C.2 The occurrence of at least 5 key invasive species that threaten the integrity of habitats and/or the productivity of landscapes are reduced by 10%, by 2014 C.3 The impacts of significant changes in landuse on the Region's natural resources (water, biodiversity, habitats, soil, and landscapes) are assessed and understood (ongoing) C.4 Efficient and sustainable irrigation practices and systems are recommended, demonstrated to, and adopted by 20% of irrigators, by 2014 C.5 Options for improved management, including reuse, of waste water for improved environmental outcomes (e.g. industrial, stormwater, domestic, agricultural) are identified, and management arrangements are developed, by 2014 **Priority 2** C.7 Annual lime application rates exceed acidification rates on land at risk, by 2017 C.8 The range of effective management options to control declared pest plant and animals in the Region is increased, by 2014 C.9 Land is managed for reduced impacts on the soil resource (compaction, subsoil infertility, waterlogging, induced and inherent sodicity, non-wetting soils, and erosion) C.10 By 2017, water use efficiency is improved by 20% due to improved soil physical condition and nutrition (includes reduction in area of non-wetting sands) C.11 Efficient and sustainable water use practices are recommended to and adopted by industrial water users (ongoing) C.12 The area of perennial plant systems that contribute to healthy landscapes and a reduction in groundwater recharge in areas susceptible to dryland salinity is increased by 20%, by 2017 **Priority 3** C.14 By 2014, impacts of existing (endemic) soil borne diseases are understood and managed, and no new soil borne diseases are introduced C.15 The effects of delving and clay spreading on agricultural production are understood, and priority actions are identified, by 2014 C.16 By 2014, the understanding of the impacts of current agricultural practices on soil health is improved, including establishing the relationships between soil organic carbon and sustainable land management, and priority actions are identified C.17 By 2017, the agricultural productivity from land that is impacted by seasonal inundation and water logging is improved by 20% compared to 2007 levels (by surface drainage, deep ripping etc.) C.18 Landholders adopt synergistic natural resource management practices that aid biodiversity conservation and sustainable land management **Goal D Effective partnerships and good governance for NRM** **Priority 1** D.1 The ability of the Region to detect, respond and manage new pest plant and animal incursions is maintained and/or improved (ongoing) D.2 Adaptive management arrangements for the Region's water resources are defined and progressively implemented (eg. integrated water monitoring strategy, risk-based strategies to protect water supply and quality etc.), by 2017 D.3 A regional resource knowledge 'system' is developed and used to guide future landuse change and/or industry development, by 2014 D.4 NRM skills and funding resources for the Region are maintained or increased (ongoing) **Priority 2**

		D.5 The Regional Flow Management Strategy is developed, by 2014 D.6 The level of support, both human and financial, for biodiversity conservation of the Region's remaining native vegetation that exists on privately owned land is maintained or improved compared to 2007 levels (ongoing) **Priority 3** D.10 The area of priority habitats protected and managed under legislative arrangements at 2007 is increased by 5%, by 2014 D.14 Existing (in 2007) cooperative arrangements are managed to improve the condition of habitats on public and private land (ongoing) AMLR & SAMDBNRM (updated May 09) SAMDB P1 Community managing natural resources sustainably RCT P1: 80% increase in the number of people managing natural resources sustainably by 2030 SAMDB P3 Landscapes are planned, developed and managed sustainably RCT P3: All landscape development and management to have a neutral or beneficial impact on natural resources by 2030 SAMDB W1 Sustainably manage all water resources RCT: All water resources are managed sustainably by 2018 SAMDB W2 Maintain acceptable water quality RCT: Improve water quality to achieve the regionally endorsed environmental values by 2030. SAMDB L1 Improve soil and land condition to increase productive capacity RCT: A 10% improvement in soil and land condition from 2008/2009 levels by 2030 SAMDB L2 Reduce the impact of land degradation processes on productive land RCT: The area of land affected by land degradation processes is reduced by 2030 SAMDB A1 Reduce net greenhouse gas emissions RCT: Reduce greenhouse gas emissions in the SA MDB by 60% by 2050 SAMDB A2 NRM in the Region is adaptive to climate variability and climate change RCT: 100% of natural resource managers incorporating climate change adaptation into their forward planning or management by 2030 SAMDB High priority research Integrated salt and water balance in the riverine corridor Smart use of water to gain maximum overall value and increase robustness of systems that rely on water Ecological impacts of different water management strategies in the Eastern MLR More robust production systems Integrated landscape scale modeling and scenario testing AMLR T1 Stormwater and waste water used. 75% of stormwater used 100% of waste water reused AMLR T2 Surface water and groundwater. All water resources meet water quality guidelines to protect defined environmental values AMLR T3 Water resources managed within sustainable limits. All water resources used within sustainable yield (allowing for

		variability) AMLR T5 Productive capacity of agriculture. Maintain productive capacity at current levels AMLR T6 Land condition for primary production. Improve land condition by 15% AMLR T13 Improve the capacity of people in the community. institutions and regional organisations to sustainably manage our natural resources Increase capacity by 20%
4. The environment on an off farm is enhanced	4.A Quantify the current off site impact of dairy farming 4.B Establish partnerships with existing and future on ground works programs that assist land managers to implement on ground action.	Area of saline land to be reduced by 30% within the drained area of the upper south east by 2010 (SE NRM) Halt the rise in groundwater levels in local and intermediate groundwater systems and the increase n salinity levels in surface water bodies by 2020 (NYAD NRM) Reduce the incidence of sheet, rill and gully erosion events by 30% by 2015 (NYAD NRM) Reduce areas of sand hills with potential drift problems by 50% by 2015 (NYAD NRM) No further fragmentation of native vegetation by 2010 (NYAD NRM) 50% of remnant vegetation patches exceeding 10ha within large remnant and threatened habitat areas protected under covenant by 2015 (NYAD NRM) Progressive improvement in the condition of areas of biodiversity significance by 2010 (NYAD NRM) Progressive increase in the area of biodiversity significance by 2010 (NYAD NRM) Reduce regional contribution of greenhouse gas emissions in line with the Kyoto protocol by 2012 (SE NRM) Areas, Sites items and other Indigenous cultural values safeguarded in NRM by 2010. (NYAD NRM) **MAT's Endorsed for 2008/09 SE Regional investment Strategy** **Goal A Healthy landscapes supporting high value ecological systems** **Priority 1** A.1 By 2014, the condition of vegetation in at least 50 remnant areas is improved by active management A.6 Risk-based strategies are developed and implemented to maintain (or improve) the quality of groundwater and surface water (eg stormwater, drains, and effluent) entering wetland, coastal and marine habitats, by 2014 **Goal B Regional communities active in NRM** **Priority 1** B.1 Support for community groups and volunteers, and participation by volunteers in NRM in the Region is increased, by 2014

		Priority 2 B.3 The benefits arising from the management of the region's water, biodiversity, and soil and land resources are acknowledged and supported by the community, by 2014 **Goal C Resilient industries taking responsibility for sustainable use and management of natural resources** **Priority 1** C.2 The occurrence of at least 5 key invasive species that threaten the integrity of habitats and/or the productivity of landscapes are reduced by 10%, by 2014 C.3 The impacts of significant changes in landuse on the Region's natural resources (water, biodiversity, habitats, soil, and landscapes) are assessed and understood (ongoing) C.4 Efficient and sustainable irrigation practices and systems are recommended, demonstrated to, and adopted by 20% of irrigators, by 2014 C.5 Options for improved management, including reuse, of waste water for improved environmental outcomes (e.g. industrial, stormwater, domestic, agricultural) are identified, and management arrangements are developed, by 2014 **Priority 2** C.7 Annual lime application rates exceed acidification rates on land at risk, by 2017 C.8 The range of effective management options to control declared pest plant and animals in the Region is increased, by 2014 C.9 Land is managed for reduced impacts on the soil resource (compaction, subsoil infertility, waterlogging, induced and inherent sodicity, non-wetting soils, and erosion) C.10 By 2017, water use efficiency is improved by 20% due to improved soil physical condition and nutrition (includes reduction in area of non-wetting sands) C.11 Efficient and sustainable water use practices are recommended to and adopted by industrial water users (ongoing) C.12 The area of perennial plant systems that contribute to healthy landscapes and a reduction in groundwater recharge in areas susceptible to dryland salinity is increased by 20%, by 2017 **Priority 3** C.14 By 2014, impacts of existing (endemic) soil borne diseases are understood and managed, and no new soil borne diseases are introduced C.15 The effects of delving and clay spreading on agricultural production are understood, and priority actions are identified, by 2014 C.16 By 2014, the understanding of the impacts of current agricultural practices on soil health is improved, including establishing the relationships between soil organic carbon and sustainable land management, and priority actions are identified C.17 By 2017, the agricultural productivity from land that is impacted by seasonal inundation and water logging is improved by 20% compared to 2007 levels (by surface drainage, deep ripping etc.) C.18 Landholders adopt synergistic natural resource management practices that aid biodiversity conservation and sustainable land management **Goal D Effective partnerships and good governance for NRM** **Priority 1** D.1 The ability of the Region to detect, respond and manage new pest plant and animal incursions is maintained and/or improved (ongoing) D.2 Adaptive management arrangements for the Region's water resources are defined and progressively implemented (eg. integrated water monitoring strategy, risk-based strategies to protect water supply and quality etc.), by 2017

		D.3 A regional resource knowledge 'system' is developed and used to guide future landuse change and/or industry development, by 2014 D.4 NRM skills and funding resources for the Region are maintained or increased (ongoing) **Priority 2** D.5 The Regional Flow Management Strategy is developed, by 2014 D.6 The level of support, both human and financial, for biodiversity conservation of the Region's remaining native vegetation that exists on privately owned land is maintained or improved compared to 2007 levels (ongoing) **Priority 3** D.10 The area of priority habitats protected and managed under legislative arrangements at 2007 is increased by 5%, by 2014 D.14 Existing (in 2007) cooperative arrangements are managed to improve the condition of habitats on public and private land (ongoing) AMLR & SAMDBNRM (updated May 09) SAMDB P1 Community managing natural resources sustainably RCT P1: 80% increase in the number of people managing natural resources sustainably by 2030 SAMDB P3 Landscapes are planned, developed and managed sustainably RCT P3: All landscape development and management to have a neutral or beneficial impact on natural resources by 2030 SAMDB W1 Sustainably manage all water resources RCT: All water resources are managed sustainably by 2018 SAMDB W2 Maintain acceptable water quality RCT: Improve water quality to achieve the regionally endorsed environmental values3 by 2030. SAMDB B1 Improve native ecosystem extent and condition to sustain ecosystem function RCT: Native ecosystem extent increased to 53% of the region and native ecosystem condition improved across the region by 10% by 2030 SAMDB L1 Improve soil and land condition to increase productive capacity RCT: A 10% improvement in soil and land condition from 2008/2009 levels by 2030 SAMDB L2 Reduce the impact of land degradation processes on productive land RCT: The area of land affected by land degradation processes is reduced by 2030 SAMDB A1 Reduce net greenhouse gas emissions RCT: Reduce greenhouse gas emissions in the SA MDB by 60% by 2050 SAMDB A2 NRM in the Region is adaptive to climate variability and climate change RCT: 100% of natural resource managers incorporating climate change adaptation into their forward planning or management by 2030

		SAMDB High priority research Ecological restoration techniques/works Strategic placement of vegetation within an experimental adaptive management framework Integrated salt and water balance in the riverine corridor Smart use of water to gain maximum overall value and increase robustness of systems that rely on water Ecological impacts of different water management strategies in the Eastern MLR More robust production systems AMLR T1 Stormwater and waste water used. 75% of stormwater used 100% of waste water reused AMLR T2 Surface water and groundwater. All water resources meet water quality guidelines to protect defined environmental values AMLR T3 Water resources managed within sustainable limits. All water resources used within sustainable yield (allowing for variability) AMLR T5 Productive capacity of agriculture. Maintain productive capacity at current levels AMLR T6 Land condition for primary production. Improve land condition by 15% AMLR T7 Condition and function of ecosystems. (terrestrial, riparian) Recover from current levels AMLR T8 Extent of functional ecosystems.(coastal, estuarine, terrestrial, riparian) Increase extent to 30% of the region (excluding urban areas) AMLR T10 Land based impacts on coastal, estuarine and marine processes Impacts reduced from current levels AMLR T12 Coast estuarine and marine water quality. All waters meet water quality guidelines to protect defined environmental values AMLR T13 Improve the capacity of people in the community. institutions and regional organisations to sustainably manage our natural resources Increase capacity by 20%
5. To assist SA dairy farmers to adapt their farming systems to cope with changes in climate.	5.A Develop an understanding of the potential impacts of climate change and variability on each South Australian Dairy Region. 5.B. Explore opportunities for South Australian farms to reduce	Reduce regional contribution of greenhouse gas emissions in line with the Kyoto protocol by 2012 (SE NRM) AMLR & SAMDBNRM (updated May 09) SAMDB P1 Community managing natural resources sustainably RCT P1: 80% increase in the number of people managing natural resources sustainably by 2030 SAMDB L1 Improve soil and land condition to increase productive capacity RCT: A 10% improvement in soil and land condition from 2008/2009 levels by 2030 SAMDB L2 Reduce the impact of land degradation processes on productive land RCT: The area of land affected by land degradation processes is reduced by 2030

	carbon emissions 5.C. Inform the South Australian Industry of policy developments in emissions trading and climate change policy.	 SAMDB A1 Reduce net greenhouse gas emissions RCT: Reduce greenhouse gas emissions in the SAMDB by 60% by 2050 SAMDB A2 NRM in the Region is adaptive to climate variability and climate change RCT: 100% of natural resource managers incorporating climate change adaptation into their forward planning or management by 2030 SAMDB High priority research More robust production systems AMLR T5 Productive capacity of agriculture. Maintain productive capacity at current levels AMLR T6 Land condition for primary production. Improve land condition by 15% AMLR T13 Improve the capacity of people in the community. institutions and regional organisations to sustainably manage our natural resources Increase capacity by 20%

NRM Actions

On-ground action to address NRM issues is not new. The dairy industry has been working for many years to improve management and optimise the use of resources. It must be recognised however that best practice management is continually evolving and not a static goal that farmers could aim to reach then stop work. Research and innovation in production and land management will ensure that there will always be further improvement that the farm must strive to achieve.

This plan aims to identify the research and innovation needs that will help to drive land management improvements while also identifying the on-ground action, awareness raising & training that is required for farmers, industry advisors and the NRM community. This will ensure that land managers know what is best practice in their system and are able to implement change on ground.

Action Summary

- Form strong partnerships with the NRM council, regional boards and government agencies to ensure strategic, policy and implementation issues are identified and addressed.
- Establish regional research programs that identify targets for change on farm.
- Ensure all dairy shed effluent systems are compliant with legislation and strive to achieve worlds' best practice.
- Assess farm NRM performance using the Dairy SAT and strive to continuously improve productivity and reduce off site impacts through training and on farm improvement.
- Ensure all activities are monitored and evaluated to enable active adaptive management resulting in continuous improvement.

Action Plan

Strategy	Actions	Dairy SAT BMP Areas	Target Outcome
Implement systems to prevent dairy shed effluent leaving the farm	• Dairy shed effluent management guidelines available to farmers. • Provide tools and training on utilisation of dairy shed effluent on farm. • Partner with the EPA to monitor industry performance.	Dairy Shed Effluent Management	No Point Source Pollution Leaving Dairy Farms
Ensure farm chemicals are managed to prevent pollution	• Provide industry input into training courses to maintain relevance • Encourage farmers to attend training and implement improvements	Farm Chemicals	No Point Source Pollution Leaving Dairy Farms
Encourage appropriate recycling or disposal of farm wastes to ensure pollution risk is addressed.	• Regional recycling and waste management opportunities identified and communicated though DairySAT.	Farm Wastes	No Point Source Pollution Leaving Dairy Farms
Quantify the potential diffuse sources of pollution and their impacts	• Utilise the results of regional research to quantify levels of diffuse source pollution	Effluent Management Irrigation Nutrients Soils Chemicals Farm Wastes	Diffuse source pollution is minimised
Ensure farmers	• Provide Dairy SAT to all farmers as a	Effluent Management	Diffuse source pollution is

are aware of BMP's and are able to source further assistance if required	facilitated program with follow up workshops on identified knowledge gaps	Irrigation Nutrients Soils Chemicals Farm Wastes Biodiversity Air & Energy	minimised
Ensure current and future industry training programs demonstrate production optimisation as well as NRM benefits	• As new programs are developed ensure triple bottom line is assessed and communicated • Provide training to industry support staff that identifies the range of industry BMP's and training programs available to farmers and the sustainability benefits expected from implementation	Effluent Management Irrigation Nutrients Soils Chemicals Farm Wastes	Production is optimised for the land and water resources used
Ensure resources are used in a sustainable manner to optimise farm productivity	• Industry to actively participate in the development of NRM policy identifying and allocating sustainable resource use • Farmers to undertake Dairy SAT to identify current performance against industry BMP's • Industry to monitor and review recommended BMP's to ensure a continual improvement of performance.	Effluent Management Irrigation Nutrients Soils Chemicals Farm Wastes	Production is optimised for the land and water resources used

Establish partnerships with existing and future on ground works programs that	• Partner with NRM boards to identify, communicate and encourage participation in existing on ground BMP programs	Effluent Management Irrigation Nutrients Soils Chemicals	The environment on and off dairy farms is enhanced

assist land managers to implement on ground action.		Farm Wastes Pests & weeds Biodiversity Air & Energy	
Develop an understanding of the potential impacts of climate change and variability on each South Australian Dairy Region.	• Monitor research and local climate change and variability predictions and communicate the implications to farmers and the industry • Utilise industry networks to examine potential impacts of change and develop local BMP's as appropriate.	Effluent Management Irrigation Nutrients Soils Chemicals Farm Wastes Pests & weeds Biodiversity Air & Energy	SA dairy farmers to adapting their farming systems to cope with changes in climate.
Explore opportunities for South Australian farms to reduce carbon emissions	• Utilise research outcomes to develop local strategies to reduce on farm carbon emissions • Communicate opportunities to reduce GHG emissions to the local industry.	Effluent Management Irrigation Nutrients Soils Chemicals Farm Wastes Pests & weeds Biodiversity Air & Energy	SA dairy farmers to adapting their farming systems to cope with changes in climate.
Inform the South Australian Industry of policy developments in emissions trading and climate change policy.	• Utilise industry networks to examine the impact of future climate change policy on the local industry. • Provide opportunities for local industry stakeholders to be informed of policy developments.	Effluent Management Irrigation Nutrients Soils Chemicals Farm Wastes Pests & weeds	SA dairy farmers to adapting their farming systems to cope with changes in climate.

		Biodiversity Air & Energy	
Monitor and Evaluate on ground works utilising active adaptive management principles to ensure continual improvement.	• Industry research to partner with NRM to monitor catchment change. • Dairy SAT action plans to incorporate monitoring, evaluation and regular review.	Effluent Management Irrigation Nutrients Soils Chemicals Farm Wastes Pests & weeds Biodiversity Air & Energy	No Point Source Pollution Leaving Dairy Farms Diffuse source pollution is minimised Production is optimised for the land and water resources used The environment on and off dairy farms is enhanced SA dairy farmers to adapting their farming systems to cope with changes in climate.

Plan Implementation

The SA Dairy Industry through Dairy SA and its Dairying for Tomorrow program will be the body responsible for the implementation of this plan.

The industry accepts that it cannot achieve these objectives alone and effort must be directed towards maintaining and building upon the existing partnerships with government and community NRM boards in order to achieve the industry's vision for sustainable NRM.

On farm improvement must be supported and encouraged by all participants in NRM recognising that ongoing improvements across an industry will result in significant progress towards catchment and State NRM goals.