Senate Environment, Communications, Information Technology and the Arts References Committee

Inquiry into the extent and economic impact of salinity

Submission from the Coalition of Concerned Landholders

Senate Presentation

Coalition of Concerned Landholders

Key Points

1. The overwhelming majority of landholders where the drainage schemes are proposed support the installation of a groundwater drain.

2. Landholders in favour of a Balanced Solution

3. Dryland Salinity is due to rising groundwater levels

4. Agricultural production and native vegetation are declining due to salinity

5. Investigations by Jim Cox (CSIRO) and M. Durkay confirm that soil salinity is an issue in both the Marcollat & Bald Hill Flats. Problem identified even on land where landholders deny they have a problem

6. Only Broadscale Scheme in Australia Reclaiming Saline Land

7. Groundwater drains have proven successful in other part of the South East

8. Purpose of groundwater drainage is to return groundwater levels back to what they were.

1. Introduction

The information in this paper is submitted on behalf of a group of 20 land holders (Coalition of Concerned Landholders) who have properties in the Didicoolum, Wimpinmerit, Bald Hills and the Taratap drainage areas. The Coalition of Concerned Landholders is in favour of the use of a balanced solution to the management of dryland salinity. A *balanced* solution is one, which takes into account the need to protect agricultural productivity and the need to protect ecological health.

The land owned by the Coalition of Concerned Landholders spans 70 to 90% of the proposed drain alignment in the identified drainage areas and so their views represent the majority of those affected by the drains and the majority of those affected by dryland salinity. Landholders have paid levies (since 1997 towards the construction of the scheme) in the vicinity of 3 million.

The occurrence of dryland salinity is a widespread problem within the inter-dunal flats of the Upper South East region of South Australia. Dryland salinity has adversely impacted on water, land and ecological resources of the region and threatened the viability of many farming enterprises.

In the late 1980's the South Australia government identified dryland salinity as a key threat and developed a solution that included a network of surface water and groundwater drains. The proposed solution was the subject of an Environment Impact Statement (EIS, Upper South East Salinity and Flood Management Plan), completed in 1993. The EIS was based on the best available scientific advice regarding the cause of dryland salinity and the best available scientific advice reading the preferred solution to dryland salinity.

Since that time much of the original drainage scheme concept has been implemented. This has proved to be successful with many landholders able to return flats to traditional farming systems. However, more recently the implementation of the final elements of the drainage scheme has stalled and the original concept design changed as a debate emerged (based mostly on non-scientific perceptions) regarding the cause of dryland salinity and the potential negative impact a drain could have. As the majority-landholders in the areas proposed to be drained, the Coalition of Concerned

Landholders are now worried that the non-scientific debate could influence decision-makers resulting in the implementation of a scheme that will not effectively treat the dryland salinity problem.

The aim of this submission is to highlight the arguments in support of groundwater drains as part of a balanced solution to the degradation of agricultural and ecological assets (based on credible scientific data and analysis). It covers issues associated with:

- The cause and nature of dryland salinity;
- The impact of dryland salinity on land, water and ecological resources; and
- Management of dryland salinity.

The Coalition of Concerned Landholders has been assisted in the preparation of this submission by Don McCarthy and Stuart Richardson (Principal Hydrogeologists with Resource & Environmental Management Pty Ltd (REM)). Don McCarthy and Stuart Richardson have a long track record in the investigation and management of dryland salinity across South Australia, both as consultants and as government employees. They were recently commissioned by the South Australian government to undertake analysis of the effects of the proposed Didicoolum drain on groundwater levels.

This submission is also supported with references to substantial work undertaken by CSIRO Land and Water and work undertaken by the Department of Water, Land and Biodiversity Conservation (DWLBC).

2. The Emergence of Dryland Salinity

There has been a substantial change in the hydrological balance of the Upper South East region because of the increase in recharge to the shallow groundwater system following clearance of native vegetation. Groundwater levels have risen in many areas up until the early 1990s. Groundwater levels are now within a metre over many of the inter-dunal flats resulting in increased evaporative discharge and the accumulation of salts in the soil profile during the summer. The presence of shallow groundwater levels has exacerbated problems associated with poor surface water drainage on the flats.

The occurrence of rising shallow groundwater on and, adjacent to, the inter-dunal flats has been confirmed through long term groundwater monitoring undertaken by DWLBC and CSIRO Land and Water who undertook statistical analysis on groundwater level data collected from 21 sites. They identified long term rising trends at 15 of those sites, correcting for climate trends (Cox *et al.* (2004)). The work by CSIRO Land and Water was peer reviewed and found to be sound.

The accumulation of salts due to evaporation from the shallow watertable has resulted in the degradation of traditional agricultural production and the degradation of important wetland and terrestrial vegetation systems. The following two paragraphs were prepared by Malcolm MacDonald from the Willalooka Pastoral Company (which owns the land where the Didicoolum drain is proposed) and provides a summary account of the emergence of dryland salinity and the impact salinity has had on agricultural productivity within that property. Malcolm has worked on the Willalooka property since 1958.

"The first agricultural development on Willalooka started in 1955 when the flats were cleared of scrub and sown to pasture with outstanding results; these flats were once regarded as some of the most productive in the district with a stock carrying capacity of 8-10 dry sheep equivalents per hectare (DSE/hectare).

Between 1965 and 1980 production slowly declined to half this stocking rate. Normal pasture renovation gave no improvement. After investigation by various government departments, serious increases in salinity were found to be the cause of the loss of production. The country was again renovated with good results using Tall Wheat grass and Puccinella, well recognized salt tolerant pasture species. These pastures covered the area well but didn't increase stocking rates to more than 4-5 DSE/hectare. As the watertable gradually rose over the next 20 years salinity levels increased until the Tall Wheat grass died out leaving only Puccinella (the most salt tolerant pasture) on the slightly higher areas. Many of the red gums on these flats died and stocking rates were reduced to 2.5 DSE/hectare. These once highly productive flats had been reduced to highly saline pans capable of growing virtually no vegetation."

There are many other examples of the negative impact of dryland salinity and the positive impacts from drainage. Testimonials from individual landholders are provided in **Attachment 1**.

There have been suggestions that dryland salinity is not a widespread problem in this district despite the loss of agricultural production and death of trees. Soil sampling undertaken for DWLBC by Cox *et al.* (2004) and Durkay (2004) across a number of the flats with shallow water tables has confirmed that shallow soils are affected by salinity, with many sampling sites with salinity ranging from high to extreme levels. Durkay (2004) measured high levels of salt build-up in shallow soils on a property where the landholder claimed there was no salinity problem and that a groundwater drain was not necessary.

The occurrence of dryland salinity is also well known as a threat to the health of important ecosystems such as the Marcollat Watercourse, as identified in the Stage 1 Management Plan prepared by the South Eastern Water Conservation and Drainage Board (SEWCDB, 1997). Evidence from landholders indicates the loss of red gums occurred in parallel to the loss of agricultural production. This situation is similar in concept to the death of floodplain vegetation along the River Murray where saline groundwater has risen due to operation of river weirs.

3. The Relationship between Groundwater Depth and the Occurrence of Dryland Salinity

Thirty years of scientific research across south eastern Australia has shown that dryland salinity is primarily a problem associated with rising groundwater levels. The situation in the Upper South East is made worse by the lack of effective surface water drainage on the flats, but fundamentally, the problem was recognized by the EIS to be driven by groundwater processes. This is confirmed by the substantial anecdotal evidence from landholders who have worked this region over the last 40 to 50 years. It follows that a properly constructed groundwater drain will alleviate the salinity problem.

There has been a suggestion that surface water drains rather than groundwater drains will be more effective. This has not been the experience of landholders in the area. As an example, the Willalooka Pastoral Company has spent in excess of $500,000

constructing surface drains on the flat where the Didicoolum drain is proposed over the last 15 years without any useful results. In wet years, when the whole system is full of water these surface drains are of no use and in average years very little water runs off the flats into the wetlands. Other landholders in the southern and central region have constructed approximately 100 kilometers of shallow surface drains without arresting the dry land salinity problem.

There has been an argument put that *"groundwater was always shallow on the flats and that groundwater levels have not risen to cause salinity"*. It is clear from the data and the analysis undertaken by CSIRO Land and Water that groundwater levels have risen. However, it is agreed that groundwater beneath the flats was shallow prior to the occurrence of dryland salinity, but it wouldn't have been *as shallow* as what it has been over the last 10 to 20 years. A small change in the depth to groundwater (say a rise of 0.5 to 1.0 metres) can have a significant effect on the rate of evaporation and the rate of salt accumulation within the soil.

Work undertaken by CSIRO Land and Water on the River Murray floodplain illustrates this concept. The following rates are indicative only:

- The indicative rate of evapotranspiration from a watertable **4 to 5 metres below ground level (m bgl)** is around 10 mm/yr – generally allowing for healthy vegetation;

- The indicative rate of evapotranspiration from a watertable **3 m bgl** is around 40 mm/yr – resulting in the occurrence of unhealthy vegetation;

- The indicative rate of evapotranspiration from a watertable **2 m bgl** is around 100 mm/yr – resulting in the occurrence of dead vegetation; and

- The indicative rate of evapotranspiration from a watertable **1 m bgl** is more than 100 mm/yr – resulting in the occurrence of salt lakes/ or land with bad salt scalds.

It is acknowledged that the River Murray information from CSIRO is based on site measurements taken from an area with a drier climate, however, the concept of rapidly

increasing rates of evaporation (and increasing rates of salt accumulation) with small rises in groundwater level is likely to hold.

There has been a perception that the recent stability in groundwater levels over the past 10 years (and some falls) means there is no dryland salinity problem. This is not correct. The Upper South East region has been subjected to a period of sustained below average rainfall conditions since the early 1990s and the occurrence of below average rainfall has resulted in the stabilization of groundwater levels. The upward trends in groundwater levels that occurred through the 1980s and early 1990s will re-occur when average and above average rainfall conditions prevail. Even under these more favourable climatic conditions high soil salinity levels have been measured by Cox *et al.* (2004) and Durkay (2004).

4. A balanced solution to the management of dryland salinity

It is understood that the preferred concept for the drainage scheme is now a package of works which integrates drainage of the flats (with various depths of drains targeting groundwater and/or surface water) and the rehabilitation of the wetlands and watercourse that lie on the western edge of the flats. The rehabilitation of the western watercourse involves diversion of additional surface water flows from the southern catchments through the watercourses coupled with the operation of sills on the outlets of the wetland basins to hold water within the wetland for a longer period of time. The rehabilitation also includes fencing off the wetlands to prevent the movement of stock through wetlands.

The Coalition of Concerned Landholders supports a way of managing the dryland salinity problem that allows for the integration of the needs of agricultural producers and the needs of the environment.

This is achieved by lowering groundwater levels beneath the flats using a drain which is at least 2.0 metres deep so that it can substantially lower groundwater levels during summer when the build-up of salt occurs, and the use of a drain which can protect agricultural land from groundwater mounding associated with the retention of water within the wetlands.

A 2.0 metre deep groundwater drain strategically located along the flat will lower groundwater levels and local experience suggests that the problem of dryland salinity will be alleviated (refer to Section 5). Drains of lesser depth may assist with the management of salinity, but are not considered to be a comprehensive solution to the salinity problem.

Retention of water in the wetland will cause increased rates of leakage of water downwards to the water table which results in the development of a mound of shallow groundwater within a few hundred metres of the wetland. The mound of groundwater will extend laterally, causing groundwater levels to rise beneath agricultural land. The occurrence of this type of problem at the Jip Jip wetland is well documented. However, most landholders will accept this element of the proposed approach as a compromise where there is a drain of suitable depth to assist in the management of the leakage from the wetland.

Landholders in the Bald Hills flat are supportive of a 2.0 metre deep drain down the eastern side of the flat to assist in lowering summer groundwater levels thereby reducing the impact of dryland salinity on agricultural production. By locating the drain along the eastern side of the flat wetlands on the western side of the flat will not be impacted due to a decline in summer groundwater levels. In addition, the salinity of groundwater beneath the eastern side of the flat is lower, increasing the potential for this water to be used for environmental purposes.

DWLBC have proposed a concept for the Didicoolum drain which (mainly) includes a groundwater drain (with depth varying nominally from 1.5 to 2.0 metres) coupled with a proposal for rehabilitation of the Marcollat Watercourse through use of artificial sills in the wetland basins to allow water to be held for longer periods in the wetland basins. The Willalooka Pastoral Company has agreed to the principles of this concept.

Modelling analysis undertaken for DWLBC (by REM, 2005) indicates that the retention of water in the Marcollat wetland basins will result in groundwater mounding, and that a drain will be needed to help control the mound. Without the drain the groundwater mound will extend across the flat and adversely impact agricultural production.

There are also concerns that the groundwater mound will lead to rising groundwater levels on the next flat to the west.

DWLBC have conceptualized the salinity problem as being driven by accumulation of salt during the dry months. For this reason it is important that the groundwater drain is deep enough to lower the summer groundwater. In many of the flats this means the drain needs to be at least 2.0 metres deep.

It is also critical that the on-going management of the drainage system includes monitoring and regular evaluation of the impacts.

As part of the Didicoolum drain, the Willalooka Pastoral Company has an area of some 300 ha which will become part of environmental management plan which includes stock exclusion and replanting of all the native species. This is one of the few red gum wetlands of this size left in the Upper South East, but without the development of the Didicoolum Drain these efforts will be in vain and this highly significant wetland will be lost for future generations.

There is also a perception from those focused only on protection of wetlands that drains on the flats will cause a reduction in the cross-flat surface water run-off to the wetlands on the western edge of the watercourse. It is the experience of the landholders that these flows are currently very limited. Furthermore, the aim of the groundwater drain is to return groundwater levels closer to those seen prior to the rises that caused dryland salinity. Consequently, cross-flat run-off with the drain in-place should be no different to that which existed before groundwater levels rose.

5. Impact of groundwater drains on groundwater levels and agricultural productivity

There is substantial evidence that the use of a groundwater drain (with appropriate depth) will quickly provide a benefit to the agricultural productivity of the flats and protect ecosystems.

The evidence, based on the DWLBC monitoring program, at the Fairview site where a 2.5 to 3.5 metre deep drain was installed was that groundwater levels were lowered by

0.5 metres 1.5 kilometres to the west, and 0.5 metres 3 kilometres to the east within a couple of years. There was also a reduction in the soil salinity at this site.

The results at the Fairview drain are consistent with estimates of impacts by previous workers (Armstrong and Stadter, 1992, Cox *et al.*, 2004 and REM, 2005) who used various forms of groundwater modelling to show that a relatively rapid and extensive drawdown of the watertable will occur with a groundwater drain and a new steady-state will be reached within 3 to 5 years.

In January 2000 the Ballater East and Wongawilli groundwater drains (the Wongawilli drain cuts 0.4 metres below the summer groundwater level) were constructed through these two flats. In 2001, 2002 and 2003 most of these flats were renovated and the stocking rates have returned to carrying livestock at approximately 10 DSE/hectare (previously as low as 2.5 DSE/hectare). The landholder has also embarked on a tree renovation project which is proving successful. Further the few trees on higher ground that survived the salt degradation are now flourishing.

There is expected to be a significant economic benefit from reduced salinity on the flats. For example, landholders with land in the Avenue Flat expect to double the economic return ($1.5M/yr based on $25/DSE for 8 DSE/ha over 7,500 ha).

There is a perception that the groundwater drain will adversely impact stock water and irrigation bores. This is unlikely to be the case. In most instances the change in the groundwater level caused by the drain is small (especially at a few hundred metres from the drain) relative to the thickness of the aquifer accessed by the water supply bore. Several landholders have water supply bores near existing groundwater drains and have not experienced problems.

6. Soil Sodicity after Salinity

There are perceptions within the community that drainage will result in an increase in sodicity. This is not correct based on information supplied by Jack England (Saltland Catchment Agronomist). The dispersive nature of soils will increase as salt is leached from the soil, but this easily managed with the application of gypsum. This process is a natural progression in returning salt affected land to the more productive situation.

There is currently a research program in-place which aims to address the issue of soil sodicity (Keilira Farm Management Group). There is a site (site 1) monitored within that program that has been drained for 50-years and exhibits low levels of salinity and low to medium levels of dispersion (a measure of the impacts of sodicity). Gypsum has been applied once every two years at 2.5 tonnes per hectare. This site is able to carry 25.5 DSE/hectare. This contrasts with Site 3 where there is only minor drainage and very high salinity levels. Soil dispersion is at medium to high levels at this site. This site is inundated for 2 months each year and the carrying capacity is around 8 DSE/ha.

7. Summary

It is recommended that the following key points be considered by the Committee:

- There is clear scientific evidence that dryland salinity is a widespread problem within the Upper South East region;
- The occurrence of dryland salinity has had a significant impact on agricultural productivity;
- Monitoring data indicates that rising groundwater levels are the primary cause of the salinity;
- The use of a groundwater drain has been *proven* to be effective in lowering groundwater levels to the *pre-salinity state* allowing for a return to traditional agricultural practices on the flats;
- There have been numerous investigations undertaken or sponsored by the SA government that confirm the cause of the salinity problem; and
- The majority of landholders affected by the drain support a balanced solution which includes a drain with depth of 2.0 metres to protect flats from dryland salinity and protects flats from groundwater mounding associated with increased flows and retention of surface water in the wetlands and watercourses.

References

Armstrong D. and Stadter F., (1992). Computer modelling to examine the performance of groundwater drains. South Australian Department of Mines and Energy, Report Book 92/57, PIRSA.

Cox J., Durkay M., Smitt C. and Davies P., (2004). Predicting the likely impacts of the Bald Hill Drain. CSIRO Land and Water Client Report – DRAFT, November 2004.

Durkay M., (2004). Soils and Groundwater Marcollat Region, Upper South East South Australia - Draft. Unpublished report prepared for Department of Water, Land and Biodiversity Conservation, August 2004.

Resource & Environmental Management (REM, 2005). Impact Assessment of the Proposed Didicoolum Drain, Upper South East, SA. Unpublished report prepared for Department of Water, Land and Biodiversity Conservation, November, 2005.

Attachment 1

Additional submissions from individual members to the coalition of concerned landholders

Soil Sodicity after Salinity

There has been considerable discussion in the community about the development of sodicity after the drainage of saline soils. This has been promoted by some people as a negative aspect of the drainage scheme.

Group members from the Keilira Farm Management Group had identified areas of poor soil structure (caused by high concentrations of sodium in the soil) and dramatically reduced plant growth and noticed these areas, found in both native vegetation and grazing land, were increasing each year.

In the Upper South East the saline soils are saline sodic soils. When the salt is removed in the reclamation process, ***soil sodicity is the natural progression on the path to a more productive situation***. Soil sodicity will be present if water tables are lowered by whatever method (perennial vegetation and/or drains). However, establishing perennial pastures on the bald hill flat at the research site has proven to be extremely difficult and unsuccessful even with the favourable conditions we have had since sowing this year. It is not feasible to control or stop the rising water table simply by planting deep rooted, high water using perennial or annual plants in this location because:

a) the soil is now to salty and significantly reduces the growing season as a result for the majority of pasture plants available commercially; and
b) Lucerne for example is severely hampered by waterlogging and is not salt tolerant.

The pH across these flats is also extremely high due to the presence of sodium carbonate in the soil. At these high pH's metal trace elements (magnesium, iron, zinc, copper, manganese, aluminium) become un-available for plant growth and becomes another limiting factor alongside salt but is less severe.

Drainage does not increase sodicity. The dispersive/repulsive nature of the soil simply increases (similar to holding magnets of the same poles together) as salts are leached away but it is easily managed with applications of gypsum. Gypsum works in three ways:

a) by removing sodium (the dispersive force) from the soil particles and replacing it with calcium resulting in increased soil stability and structure necessary for plant growth;
b) by acting as a salt that lowers the dispersive properties and stops structural breakdown of the soil; and
c) lowers the pH of the soil.

Gypsum should not be added to saline soils because it is a salt itself and will further limit plant production. Gypsum takes effect as further leaching occurs.

Comparisons between two of the Keilira Farm Management Group research sites:

Site 1 - has been subject to drainage for almost 50 years and exhibits only low levels of salinity. Dispersion, an indicator of poor soil structure caused by sodicity, is low to medium throughout the soil profiles. Gypsum has been applied once every 2 years at 2.5 tonnes per hectare.

Site 3 - situated 20km north of the Fairview Drain on the Bald Hill flat has only minor surface drainage. Very high salt readings were recorded as the high groundwater levels throughout this area allow saline water to wick and rise through the soil profile,

evaporate on the soil surface and cause high salt accumulations. Soil dispersion is medium to high (even in the presence of salt).

Site 1 - With the utilisation of a weir to manage soil water in spring and early summer and a mix of perennial and annual pastures the paddock carries **25.5 dry sheep equivalents (DSE)** a year.

Site 3 - **7.9 dse** carry with a mix of perennial but predominantly annual pastures. 60% of land is inundated for 2 months.

Therefore, the limiting factor at site 3 is salt and water logging and to some extent pH.

If no remedial management measures are implemented now, what happens if/when salt and pH levels reach a point where not only the pastures can not grow, but the native vegetation and wetlands suffer due to this poor quality water entering the system?

Jack England
Saltland Catchment Agronomist

DELRO PASTORAL CO. PTY. LIMITED

REGISTERED OFFICE; **"Alaman"**
Private Bag 263

NARACOORTE, SA 5271
116 Greenhill Road, **phone 87 658051**
Unley. SA 5061
2005

10th November

The Fairview drain was constructed through the property "Alaman" during February March 1998 at a time when dry land salinity was having a devastating effect particularly at the south western end of the property.

Flats were covered with samphire, weed and barley grass so badly that they were no longer fertilized and considered useless.

Today these same flats are included in the fertilizer programme, producing feed suitable for cattle due to an amazing recovery over the last three years.

The Fairview and Tatiara drains border this area before entering a scrub/wetland block (1,450 Ha.) and passing across the Bakers Range water course upstream from the main swamps via an overpass which prevents the drain water mixing with the water course flows.

Stock are not permitted in the scrub and have not been for the past forty years, keeping the area natural and healthy.

However had the drain not been constructed in this area, by my observation of the spreading salinity over the years, I feel that it was only a matter of time before the vegetation would have been effected, which has already occurred with other wetland areas in the district.

The Alaman wetlands have not held a lot of water over the last ten years and may have caused loss of certain plants but those 10 years have been dry years.

During August 2005 after the break of the season the fresh flows of the water course reached half way through the swamps and would probably have retained a reasonable depth if rainfall had been better during September.

In closing, stock numbers on the property have been raised slightly over the last three years but the emphasis has been on pasture renovation with exceptional results which has not been the case over the previous 6-8 years due to saline ground and poor growth.
J. DEL FABBRO (owner)

Fisher Nominees Pty. Ltd.
"Clover Ridge"
Marcollat SA 5271

Mobile 0408 849162

Property has both Wongawilli and Ballater East drains starting in it.
Country was bought as scrub in 1957, cleared between 1958-65, grew good pasture for a few years. About 1970 the flats degraded to rye grass for about two years, then to barley grass, then to sea barley grass and samphire. Stocking rates decreased from about 3DSE per acre to 1/2 DSE per acre. Sowed flats to puccinella and tall wheat grass about 1975-78, grew good puccinella which ran about 1-1.5 DSE per acre.

Drains went in, in 2000. Wongawilli and Ballater East drains both rise on Clover Ridge. Within twelve months puccinella was dying out and volunteer clover and Lucerne were seen. Sowed small area by drain 12 months after the drain went in, sown to hay mix which yielded 4 ton per acre. Best we have ever had.

Now we have re-sown most of the flats with Lucerne, clovers, rye grass, Demeter and a barley crop and are all doing **VERY** well.

You are welcome to visit and inspect these areas any time; the drains are working well and doing all and more than we hoped for.

I believe that deep drains (2m) should be put in to remove excess water and salt. Then worry about other problems **BUT we cannot do any thing without first removing the water and salt.** Weirs later may be an option.

Revegetation with timber and scrub would need to be about 80% of the area and is not a proposition to graziers. It would be like piddling in the sea.

Peter Fisher

NONNING PASTORAL

KILMORY
BOX 130
NARACOORTE, SA 5271
9TH November, 2005

Telephone 87 658053

Mr. Charles Bruce
FAX 87 675 075

Dear Charles,
In reply to your query about the effectiveness of deep drains on our property of 3,000 Ha. situated approximately 1 kilometre west of drain "E" to the south of Jaffray swamp.

The Fairview drain runs through the south west corner of the property, and our private drain runs off it to the east for 3 kilometres.

Prior to the installation of those drains water in that vicinity was variable up to 6,000ppm, the pasture deteriorated to salt tolerant types, and trees were dying.
The present situation is the water being generally stable at about 4,500ppm, clovers and better pasture growing, and less trees dying.

Last year we planted Lucerne on low ground adjacent to our drain which is growing well and we plan to plant more as soon as practical.

Our areas away from those drains are showing signs of salinity and the underground water has not improved.

We would like to see deep drains as soon as practical in our western, northern and eastern areas.

Regards,

M.I. McTaggart.

WILLALOOKA PASTORAL COMPANY

SALINITY ON WILLALOOKA FLATS

Willalooka Pastoral Company has three interdunal flats that have been or are salt affected over the last twenty years.

Backgound

The first agricultural development on Willalooka started in 1955 when the flats were cleared of scrub and sown to pasture with outstanding results; these flats were once regarded as some of the most productive in the district with a stock carrying capacity of 8-10 DSE/hectare.

The Emergence of Dryland Salinity

Between 1965 and 1980 production slowly declined to half this stocking rate. Normal pasture renovation gave no improvement. After investigation by various government departments, serious increases in salinity were found to be the cause of the loss of production. The country was again renovated with good results using Tall Wheat grass and Puccinella, well recognized salt tolerant pasture species. These pastures covered the area well but didn't increase stocking rates to more than 4-5 DSE/hectare. As the water tables gradually rose over the next 20 years salinity levels increased until the Tall Wheat grass died out leaving only Pucinella (the most salt tolerant pasture) on the slightly higher areas. Many of the redgums on these flats died and stocking rates were reduced to 2.5 DSE/hectare. These once highly productive flats had been reduced to highly saline pans capable of growing virtually no vegetation.

Effects of the groundwater drainage and the need to continue with the program

In January 2000 the Ballater East and Wongawilli groundwater drains were constructed through two of these flats. In 2001, 2002 and 2003 most of these flats were renovated and the stocking rates have returned to carrying livestock at approximately 10 DSE/hectare. The company has also embarked on a tree renovation project which is proving successful. Further the few trees on higher ground that survived the salt degradation are now flourishing.

The Longerong flat, currently without a drain, but part of the proposed Didicoolum drain which includes the wetlands to the west is starting to suffer the same plight as the other two adjacent flats. The redgums around the wetlands have started to die and the pasture is loosing productivity in the same pattern as experienced on the other flats. If the same drainage solution isn't implemented it is virtually certain widespread degradation of the flats and more importantly the entire wetlands system will ensure. This would clearly be a travesty.

As part of the solution, Willalooka has an area of some 300 ha which will become part of environmental management plan which include stock exclusion and replanting of all the native species. This is one of the few Red Gum wetlands of this size left in the Upper South East – but without the development of the Didicoolum Drain these efforts will be in vain and this highly significant wetland will be lost for future generations.

Some people who don't have a understanding of the causes of dryland salinity in this region propose surface drains as a potential solution the problem. Willalooka has spent in excess of $500,000 constructing surface drains on the Longerong flats over the last 15

years without any useful results. In wet years, when the whole system is full of water these surface drains are of no use and in average years very little water runs off the flats into the wetlands.

For the wetlands of the Upper South East to have sufficient good quality water to sustain them, the flows from the Lower South East need to be directed north instead of flowing out to sea. This sort of action would need to be implemented with the sensible use of groundwater drain to control the rising water table.

Conclusion

Willalooka Pastoral Company has not seen any scientific evidence nor experienced any detrimental effects of groundwater drains. This experience is consistent with the experience of most of the drains in the Lower South East – some of which have been in place for over 100 years and others in excess of 50 years – and the Environmental Impact Study which formed the basis of the program in the first place.

Along with most landholders we consider the groundwater drainage the only effective solution to the control of dryland salinity in the Lower South East and recommend the program be continued in areas where the problem exists.

We implore this committee to consider the available scientific evidence on this matter and treat with suspicion emotive arguments based on some peoples subjective perception of the issues.

I ask the members of this committee to ask themselves a simple question.? Why would Landwoners such as the Willalooka Pastoral Company with such considerable first hand experience of groundwater drainage continue to support further drainage, if there was any negative effects on the environment or agricultural productivity of the land. ?

G.W. & C. L. CLOTHIER & SONS
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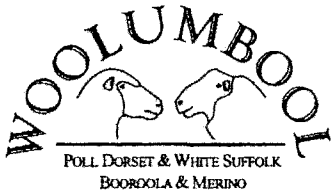

STUD MASTER: Phil Clothier
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Letter in Support of Coalition of Concerned Landholders
Represented by Mr John Ratcliff & Mr Charles Bruce in their submission to the
Inquiry into the extent and economic impact of salinity
Adelaide session scheduled for 16 November 2005

8th Nov 2005

To the committee members

I, Philip Clothier, am a 52 year old farmer from the Hundred of Woolumbool which is in the southern zone of the Upper South East Dryland Salinity drainage scheme. I am a member of a family farm which has farmed this area since 1960 and has lived on the farm for the best part of the 45 years since taking up the land.

During that period I have witnessed extremely wet and dry years and the slow but sure deterioration of much of the once better pastured lower lying areas of the farm, from the immediate effects of flooding and slowly rising groundwater. These areas even under native vegetation did have quite high water tables. These high water tables (which I might add are of very low quality water, much worse than the often mentioned Murray River) have risen even higher since land clearance and as a result began to leave increasingly saline deposits in the pasture root growth zones during the summer period. This resulted in very poor seed set of annual legumes due to pinching of the forming seeds in late spring which then began to result in pastures with little or no legume content, which any agronomist will tell you results in very low quality pasture. The pastures eventually consisted of annual grasses mainly comprising Sea barley grass and Silver grasses with some occasional legumes depending on the seasonal conditions during that year. As a result stocking rates on this land was reduced to around 5dse(dry sheep equivalents)/hectare and was only suitable for mature animals particularly over summer.

While this deterioration occurred our family continued to pour many thousands of dollars into pasture renovation, initially to conventional pastures and in later years (pre drainage) to pastures suited to saline or semi saline conditions. The end result of all of this expenditure was no tangible gains at all, due to the conventional pastures immediately reverting to the poor quality previously described and the later saline tolerant pastures succeeding to some extent but finally being of no more value purely because legumes failed to succeed and provide the nitrogen required to sustain the saline tolerant grasses. Saline tolerant grasses such as Puccinellia are a very poor pasture from a productive perspective particularly if nitrogen is not supplied with only a limited capacity to produce bulk quantities of the type of feed required on highly productive and sustainable farming enterprises.

During February 1998 our region was very fortunate to have the first drain (Fairview Drain) in the Upper South East Dryland Salinity and Drainage scheme installed with a

4 kilometres section cut through our property. This drain is a groundwater drain and ranges in depth from 2 to 3 metres. It removes groundwater all year round and also removes excess surface water during the winter months.
To suggest that this drain has not begun to achieve the purpose it was installed for would be nothing short of lunacy. My observations over the intervening 7 years would lead me to believe the eventual achievements of this drain will be spectacular from an agronomic point of view and with the environmental aspects attached to the entire scheme, one would expect over the course of time the scheme over its entirety will be recorded as one of the major events in the development of the Mid & Upper South Eastern region with positive benefits for both agriculture and the environment.

During the period since the Fairview drain installation our family has embarked upon serious pasture renovation in the previously mentioned areas. The forerunner to this renovation was soil improvement through conditioning with clay to improve moisture and nutrient holding capacity. This was achieved through either delving subsurface clay or spreading clay from nearby pits or the drain spoil bank whichever was appropriate for the particular area. The clay was applied at approximately 250 tonnes per hectare. This activity would not have been pursued prior to drainage because the water dynamics were unchanged. During the clay application and incorporation period we did some opportunity cropping with barley, canola and hay crops. Yields from the barley crops ranged from 3 to 4.5 tonne per hectare of mostly malting grade grain, yields from canola were more variable ranging from 0.5 to 1.5 tonnes per hectare while hay cuts yielded from 6 to 9 tonnes of dry matter per hectare which I believe is a very creditable result. The paddocks have now mostly been repastured to a combination of legumes which in the main have some tolerance to salinity and a couple of perennial grasses. The resulting pastures from these paddocks during this 2005 spring are nothing short of incredible.

One of the earlier established paddocks during this past winter was stocked with stud ewes at 15 dse/hectare throughout the winter lambing period, where they successfully lambed during what was a particularly tough winter. The average winter stocking rate on this property is 10 dse/h. The average annual stocking rate on this property is in the range 6.8 to 7.5 dse/h. It is my belief that the newly established pastures on the areas which were previously estimated to be carrying no more than 5 dse/h will be able to comfortably carry in the range annually of 9 to 10dse/h. and quite possibly up to 12dse/h.
In addition to the pasture establishment on the lower saline prone land we are also clay spreading and renovating our rising land with new Lucerne varieties. This has the added advantage of the introduction of a deep rooted perennial plant which aids in soil water usage and hence less addition to the water table.

In closing, from my observations over many years I can do nothing else but recommend the completion of the Upper South East Dryland Salinity and Drainage scheme in its entirety as currently proposed and from a levy payers perspective would be extremely angered at any suggestion of halting or changing excepting for commonsense proposals, the proposed scheme in any way.

Yours Sincerely
PG Clothier

From: Len & Annette Vandepeer [
Sent: Friday, 11 November 2005 12:20 PM
To: bruce
Subject: Drainage

As a Member of a family that has farmed in the Hundred of Minniecrowe for 57 years, and now has a 1.8km section of the Fairview drain crossing our property, I wish to convey to the committee our observations as to its effects on the surrounding land and our property.

The area that the drain passes through was very saline (and still is but to a much lesser extent) and could only support pastures and species of plants that were highly salt tolerent, but since the drains construction the surrounding land can now carry at least twice the former stocking rate with the introduction of more productive pastures, and I belive that these rates will improve further as more salt moves down through the soil profile.

Its effects on the surrounding native vegetation can only be described as positive in that we have not observed any changes other than an increase in the germination of some Melaleuca and Eucalyptus species

In concluding I would suggest that those people opposing drainage in the South East for whatever reasons are denuding themselves as to the long term benifits it provides to both native vegetation and farming land, Because salt will eventually destroy both.

Len Vandepeer

From: Anthea Clarke [
Sent: Monday, 14 November 2005 12:31 PM
To: Bruce@
Subject: Upper South East Drains

Philip Clarke,
Bin Bin Station,
Keilira S.E.

To Whom It May Concern,

Since the deep drain has been dug our land has gone from salt scalds, growing sea barley grass, to land that we can grow cereal crops and plant back to pasture. The drains have enabled us to hugely improve our production & profit.

Yours faithfully
Philip Clarke

"Newry"
P.O. Box 80,

Kingston, S.A. 5275.
Tuesday November 8 th 2005

I believe that two metre deep drains are the best solution to the drainage problems in the upper south east for the following reasons.

a. That type of drainage has worked well on the southern section of the Upper south east scheme according to all the people I have spoken to (eg, Clothiers, Keilira Station). My neighbour Tom Brinkworth dug many kilometres of shallow drains before digging all two metre drains which he believes are the best way to go.

b. We have an area of wetland - Big Telowie Swamp which is at the start of the Henry Creek. This swamp has been filled by ground water from the Kercoonda Drain for the last three or four years and is the only wetland on our property which has had reasonable amounts of water in that time frame. From our point of view there does not appear to have been any damage caused by using ground water to fill the swamp. The Henry Creek has also flowed in most of those years for the same reason and also with out any damage to surrounding vegetation.

c. Where I have been able to monitor the drains passing close to native vegetation, there appears to be no detrimental affect on the vegetation by the drain. My experience is that if a swamp is allowed to dry out for longer periods the swamp paperbark or teatree will start to grow on the swamp.

d. I believe a smaller profile two metre deep drain with weirs and channels to the wetlands gives us the most flexibility to be able to improve both the areas for native vegetation retention and agricultural production. During the periods of high surface water flow the drains can be partially blocked and the fresh water sent to the wetlands. During the summer when there in no surface flow the drains can be opened and the more saline ground water can be slowly removed from the area.

regards,
Keith McBride.

Statement to the Senate Inquiry into Salinity and Drainage –

a supporting statement from PJ&MH England, woolgrowers and sheep breeders in the Keilira district, to be submitted as part of the Keilira/Bald Hill drainage submission

Summary

- Nil drainage of the Avenue/Bald Hill flat is a lose-lose scenario – agricultural productivity will decline, the regional and state economy will suffer and the majority of the wetland system will be seriously compromised by lack of sufficient flows
- A dual water management system with a floodway in the west and a deep drain in the eastern sector will provide a win-win outcome.

Key Point Submission

- The area is relatively "new" country, developed and pastured 20-50 years ago, overlying saline groundwater
- Rising water table and increasing salinity, coupled with occasional winter inundation and very high pH means seriously impaired production, with significant areas growing only weak barley grass
- Serious concerns for long term sustainability without deep drainage coupled with lucerne and other deep-rooted perennials to counteract rising water table
- We strongly support enhancement of the wetlands and large areas of native vegetation along the western portion of the Bald Hill flat
- Limited extent of inundation and lack of flushing flows constitute a serious impediment to long term health of these wetlands
- A series of contributing factors, especially decreased winter water shedding from sown pastures with improved soil structure and interception of major historical flow pattern by the Blackford drain
- Modest reduction in catchment area has resulted from the Fairview drain, and some further diminishment of annual flows may result from the proposed deep drainage in the eastern sector of the flat (which is so vital for long-term sustainability of pasture-based farming systems)
- A series of abnormally dry years in the past decade has exacerbated the runoff deficit – for example there has been virtually nil flow from the 2000 hectare area operated by us and our family (located at the southern end of the catchment)
- We are convinced that peak flow diversion from the Fairview drain at times of acceptable water quality is the only viable long term answer for the string of wetlands from Park Hill to the Double Swamps and Henry Creek
- We firmly believe that a dual water conservation and drainage system, with a floodway with suitable structures to manage flows from the Fairview drain (and increased harvesting of local water using shallow drains) coupled with a deep drain to the east to convey more saline groundwater into the main drainage system via the Kercoonda bypass is a practical solution to the needs both of agriculture and the wetland/native vegetation systems.

Please note also that we dispute the contention that deep drainage inevitably destroys native vegetation – we have noticed increased vigour of native vegetation on our property in the proximity of the Fairview drain

KEILIRA STATION

Keilira Station is a 8,000 acre property, of which 3,000 acres is adjacent to the Fairview Drain. The remaining 5,000 acres is undrained. The drain has allowed us to vastly improve our pastures and crop between 1,000 and 1,500 acres annually. Below are the stocking rates and crop production before and after drain construction. Trees and native vegetation that was dying because of rising salinity is now recovering, to thrive along side the drain.

Year	Cattle	Sheep	Crop – Triticale, Beans, Wheat, Barley, Canola
1989	189	12172	
1990	238	12187	
1991	304	10897	
1992	358	11635	
1993	464	12122	
1994	496	10615	
1995	668	9404	
1996	714	9491	
1997	819	9120	
1998	809	9306	
1999	949	7706	521 tonne
2000	940	7026	542 tonne
2001	967	7567	1202 tonne
2002	1028	9313	546 tonne
2003	1217	10521	832 tonne
2004	1111	9119	976 tonne
2005	1047	9402	have not harvest yet

We have been able to include cropping without dropping our stock numbers. We can see the advantages of deep draining the remaining 5,000 acres, for both agriculture and the environment.

Native vegetation thriving along side Fairview Drain.

Gums generating along side Fairview Drain.