

Survey and Reclamation of Saline/Alkaline Scalds
in the Uralla/Walcha district of
Northern New South Wales

by

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ABSTRACT

This research project was initiated by the Harhnam and Bozo landcare groups in response to concerns expressed by landholders on the Northern Tablelands of New South Wales about the apparent increase in saline/alkaline scalds in the early 1990s. The aim was to investigate the extent and severity of bare scalds with a view to testing different methods of making them productive again. The project was initiated in 1992 and funded under the National Landcare Program (NLP) program, formerly the National Soil Conservation Program (NSCP). The project concentrated on the districts of Uralla, Wollun and Walcha, an area of approximately 30000 hectares.

Two surveys (landholder and field surveys) were carried out initially to gauge the extent of the problem within the study area. A total of 82 saline/alkaline sites were located from the landholder survey, and more detailed information collected from 50 of these in field surveys. The surveys indicated a wide variety of characteristics among the scalds and the general pattern appeared different from the pattern of salinity described for Western Australia and Victoria. Twenty experimental sites were then chosen based on similar site characteristics such as position in the landscape, slope, site characteristics and vegetation and five replications of a control and 4 treatments consisting of ponding, reverse interception drains and the application of gypsum and epsomite were set up. The gypsum and epsomite were applied inside steel rings at the same sites.

A total of 46 piezometer tubes were installed across the two landcare groups at a depth of 4 metres to tap shallow groundwater. The electrical conductivity (EC) and pH of water from the piezometer tubes were highly variable across all the scalds sampled in the two landcare groups.

The average EC to different depths can be estimated using electromagnetic induction surveys. Two instruments (EM31 and EM38) each with slightly different characteristics, were used for a broadscale survey of several sites and more detailed surveys of the 20 experimental sites. These surveys again emphasised the variability among the different scalds and indicated that the highest levels of salinity do not necessarily occur beneath the bare scalded areas. Soil cores and piezometer tubes located in the centres of scalds need not necessarily provide information which is representative of each scald. Electromagnetic surveys of individual scalds would be beneficial if they were carried out prior to either the installation of piezometers or further studies of scald characteristics.

The treatments all proved successful in modifying specific aspects of the treated scalds. The ponding treatment lowered soluble salt concentrations in the soil profile by dispersing salts with water pumped to areas away from sites of concentration. The reverse interception drains alleviated waterlogged sites and re-directed both surface and lateral flow of water from the scalds. The gypsum and epsomite at 5 tonnes per hectare proved successful in changing the chemical status within the soil profile to a depth of at least 400 mm. The sodium ions were replaced by the divalent cations of calcium and magnesium. Calcium was provided by the gypsum and the epsomite provided magnesium. The surface infiltration rates were improved at the reverse interception drains and the gypsum and epsomite treatments, but did not change over time for the ponding and the control treatments.

The reverse interception drain scalds were colonised by *Cynodon dactylon* (couch), *Hordeum marinum* (sea barley grass) and *Pennisetum alopecuroides* (swamp foxtail grass) while the chemical applications were associated with the introduction of other grasses such as *Bromus brevis* (short brome), *Eleusine tristachya* (goose grass), *Festuca elatior* (fescue), *Paspalum dilatatum* (paspalum), *Lolium rigidum* (annual ryegrass), *Phalaris aquatica* (phalaris) and *Vulpia bromoides* (squirrel-tailed fescue). Little change occurred in the vegetation at the control scalds or those with ponds.

This study provides some basic information to assist landholders in the choice of specific treatments for saline/alkaline scalds. Each scald requires its own evaluation of the problems at that site and the best treatment to adopt should be based on the individual scald. Chemical ameliorates can be used on flat land, while ponds can be positioned on slopes of 1-2% and reverse interception drains can be used on slopes above 2%.

Apart from the implementation of treatments, landholders can also assist future research by monitoring individual saline/alkaline scalds. This can be accomplished by pegging the margins of scalds and periodically mapping and photographing them to gauge their expansion or contraction. It is only through such a reliable data base that the actual patterns of development of saline/alkaline scalds can be understood.

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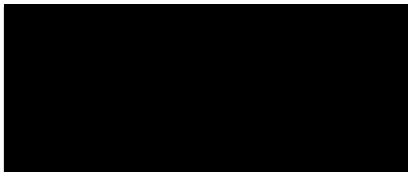
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DECLARATION

I certify that the substance of this thesis has not already been submitted for any degree and is not currently submitted for any other degree.

I certify that any help received in preparing this thesis, and all sources used have been acknowledged in this thesis.



Jeanette Murray

TABLE OF CONTENTS

	Page
ABSTRACT	ii
 <u>CHAPTER ONE</u> INTRODUCTION	
1.1 Background History	1
1.2 Northern Tablelands Perspective	2
1.3 Aims of the Project	2
 <u>CHAPTER TWO</u> DESCRIPTON OF THE STUDY AREA	
2.1 Study Area	4
2.2 Geology and Geomorphology	5
2.3 Soils	6
2.4 Climate	6
2.5 Vegetation	8
 <u>CHAPTER THREE</u> LITERATURE REVIEW	
3.1 Saline and Alkaline Soils in Australia	9
3.2 Review of Salinity and Alkalinity	10
3.2.1 Source of Salts	10
Cyclic Salts	10
Rock Weathering	13
Fossil Salts	16
3.2.2 Alkalinity	17
Alkalinisation Process	22
3.3 Classification of Saline/Alkaline Soils	24
3.3.1 Saline Soils	24
3.3.2 Saline-alkaline Soils	25
3.3.3 Non-saline-alkaline Soils	25
3.4 Properties Affected by Salinity/Alkalinity and their Effects on Soils and Plants	27
3.4.1 The Role of Ions in Relation to Soil Physical and Chemical Problems	27
3.4.2 The Importance of Ion Exchange Phenomena	31

3.4.3	Osmotic and Specific Toxic Effects of Ions on Plants	32
3.4.4	Reduction in Hydraulic Conductivity	33
3.4.5	Dispersion and Swelling Effects	34
3.4.6	Clay Mineralogy	35
3.4.7	The Importance of pH and Associated Factors	36
3.4.8	Infiltration Rate	38
3.5	Groundwater and Hydrogeological Aspects in Relation to the Development of Salinity/Alkalinity	39
3.5.1	Introduction	39
3.5.2	Groundwater Reservoirs - Watertable and Aquifers	40
	Watertables	40
	Aquifers	42
3.5.3	Groundwater Characteristics	44
	Solutes in Groundwater	44
	Rainfall and Evaporation and Groundwater Systems	45
	Spatial and Temporal Variation of Discharge and Recharge	48
	Lateral Movement	49
	Position in the Landscape in Relation to Concentration of Salts	50
3.5.4	Groundwater Rise and Soil Salinisation in Relation to Vegetative Patterns	50
3.6	Salinity/Alkalinity in the Uralla - Walcha districts	51
3.7	Reclamation of Saline and/or Alkaline soils	55
3.7.1	Introduction	55
3.7.2	Controlling Salinity and Alkalinity - Review of Reclamation Strategies	57
3.7.3	Reclamation of Saline/Alkaline Soils	58
	Organic Amelioration of Alkaline soils	59
	Electrolytes and Cation Exchange Processes	59
	Reclamation of Saline/Alkaline Soils with Gypsum	60
3.7.4	Drainage	62
	Interception Drains	63
3.7.5	Ponding Technique	65
3.7.6	Summary of Salinity/Alkalinity in Australia	66
	Saline Seeps in Relation to Soil Type	68
3.7.7	Detailed Aims	68
	Amelioration Treatments	69

CHAPTER FOUR METHODS AND MATERIALS

4.1	Surveys	70
4.1.1	Landholder Survey to Determine Severity of Saline/Alkaline Scalds	70
4.1.2	Field Survey of Saline/Alkaline Scalds	70
4.1.3	Installation of Piezometer Tubes	71
4.1.4	Detailed Investigation of a Scald at “Adgin Green”, Uralla	73
4.1.5	Soil Pit	76
4.1.6	Electromagnetic Induction Surveys	76
4.2	Scald Amelioration	79
4.2.1	Ponds	79
4.2.2	Reverse Interception Drains	81
4.2.3	Chemical Ameliorant Trials	83
4.2.4	Control Sites	85
4.2.5	Fencing	85
4.2.6	Soil Cores for Analysis	85
4.2.7	Infiltration Measurements	86
4.2.8	Statistical Analysis of Results	86

CHAPTER FIVE RESULTS

5.1	Surveys	87
5.1.1	Landholder Survey	87
5.1.2	Field Survey	88
5.1.3	Piezometer tubes.	95
5.1.4	Detailed Investigation of a Scald at “Adgin Green’, Uralla	97
5.1.5	Soil pit at “Wollun Station”, Wollun	103
5.1.6	Electromagnetic Induction Surveys	105
5.2	Scald Amelioration	112
5.2.1	Ponds	112
5.2.2	Reverse Interception Drains.	118
5.2.3	Chemical Ameliorant Trials.	122
5.2.4	Treatment Comparisons	127
5.2.5	Infiltration Measurements	130

CHAPTER SIX DISCUSSION

6.1 Saline/Alkaline Scalds in the Uralla-Walcha district	132
6.2 Scald Reclamation	137
6.2.1 Ponding	137
6.2.2 Reverse Interception Drains	139
6.2.3 Chemical Ameliorants of Gypsum and Epsomite	139
6.3 Recommendations	142
REFERENCES	144
APPENDICES	158
APPENDIX A Landholder Survey Sheet	159
APPENDIX B General Survey used for all Saline/Alkaline scald sites	160
APPENDIX C Laboratory Analysis Methods for Soils carried out by Lanfax Laboratories .	161
APPENDIX D Analysis of thirty-five core samples at “Adgin Green”, Uralla	162
APPENDIX E Cochran’s Test for homogeneity of variance	174

LIST OF TABLES

Table 3.1	Factors affecting salinisation and desalinisation	13
Table 3.2	Criteria for salinity, sodicity and alkalinity (after Northcote & Skene, 1972)	25
Table 3.3	Classification of salt affected soils according to the electrolytes present, type of soil and the environment in which each type is common	26
Table 3.4	Principal chemical constituents in groundwater-their sources and concentrations	45
Table 3.5	List of plants suitable for sowing on saline areas of NSW	57
Table 3.6	Schematic grouping of solonchaks and solonchaks soils and suggested methods of amelioration	59
Table 4.1	Summary of treatments and properties in the Harhnam and Bozo landcare groups	79
Table 5.1	Percentages of 82 saline/alkaline scalds in the Harhnam and Bozo landcare groups which possessed the following attributes in the landholder survey	87
Table 5.2	Percentages of the 50 saline/alkaline scalds in the Harhnam and Bozo landcare groups having the different attributes investigated in the field survey	89
Table 5.3	Electrical conductivity (dS/m) of soil samples from properties within the Harhnam and Bozo landcare groups	92
Table 5.4	pH (CaCl ₂) of soil samples from properties within the Harhnam and Bozo landcare groups	94
Table 5.5	Location, electrical conductivity (dS/m) and pH water samples from shallow piezometers on the Northern Tablelands of New South Wales	96
Table 5.6	Salt loads surrounding a scald at "Adgin Green", Uralla for areas measuring 25m x 28m at depths of 100mm increments down the soil profile	101
Table 5.7	Summary description of soil features from the surface to 2.0m depth of a soil pit at a scald at "Wollun Station", Wollun	104
Table 5.8	Comparisons between EM38 survey and soil cores extracted at the 20 experimental sites	105
Table 5.9	Percentages of the total dissolved solids (TDS) represented by Na ₂ CO ₃ calculated from the amount of soluble sodium in solution	117
Table 5.10	Exchangeable sodium, calcium, magnesium, potassium (mg/kg), ESP, SAR and pH of initial and final soil cores for the five experimental treatments of gypsum (calcium sulphate) for the following depths: 0-100 mm, 100-200 mm, 200-300 mm and 300-400 mm	122

Table 5.11 Exchangeable sodium, calcium, magnesium, potassium (mg/kg^{-1}), ESP, SAR and pH of initial and final soil cores for the five experimental treatments of epsomite (magnesium sulphate) for the following depths: 0-100 mm, 100-200 mm, 200-300 mm and 300-400mm	122
Table 6.1 Comparisons between soil core EC values and the EM38 electromagnetic survey including two hypothetical soil cores at H1 and H2	135

LIST OF FIGURES

Figure 2.1	Location of properties in the Harnham and Bozo landcare groups	4
Figure 2.2.	Mean monthly rainfall for Uralla and Walcha, Northern Tablelands	7
Figure 3.1	Distribution of salt affected soils in Australia	9
Figure 3.2	Major pedogenic zones resulting from recent arid periods in south eastern Australia	12
Figure 3.3	The formation of significant amounts of various compounds in relation to the combined action of weathering and leaching	14
Figure 3.4	Schematic profile of alkali soils with structural B horizons (solentz) showing different soil profile development	20
Figure 3.5	pH spectrum of different salt-affected soils	26
Figure 3.6	Classification of sodic soils and the predominant chemical species present in their solution	27
Figure 3.7	Some different kinds of salt stress injury and the stresses casuing them	33
Figure 3.8	Effect of soluble salts on pH changes of saline and alkaline soils	36
Figure 3.9	Relationship between pH and the availability of plant nutrients	38
Figure 3.10	Schematic cross section illustrating saturated and unsaturated zones of a soil profile	41
Figure 3.11	Structure of both a confined and unconfined aquifer	43
Figure 3.12	Variation in average water table level and weekly average precipitation in Beaverdam Creek Basin during the period 1950 to 1952	46
Figure 3.13	Generalised effects of water table depth on evapotranspiration for three ground- cover conditions	47
Figure 3.14	Interrelations of water table level, recharge and evapotranspiration flucuations . .	48
Figure 3.15	Typical groundwater level variations in metres ADH (1) for a piezometer with groundwater levels on a saline discharge site. Rainfall in mm(2) is shown as bar graph	49
Figure 3.16	Diagrammatic representation of a interception drain.	65
Figure 4.1	Diagrammatic representation of peizometer tubes used in the research study . . .	72
Figure 4.2	Diagrammatic representation of grid system at “Adgin Green”, Uralla	75

Figure 4.3	Diagrammatic representation of ponding system	81
Figure 4.4	Reverse interception drain general design	81
Figure 5.1	Frequency distribution of soil samples with different values of electrical conductivity (dS/m) for surface, 0-100 mm, 100-200 mm, 200-300 mm and 300-400 mm depths	91
Figure 5.2	Frequency distribution of soil samples with different	91
Figure 5.3	Frequency histogram for soil samples measuring pH at different depths in scalds	93
Figure 5.4	Exchangeable sodium, calcium and magnesium (mg/100g soil) expressed as percentages of the exchangeable Na ⁺ , Ca ²⁺ and Mg ²⁺ for soil cores at “Adgin Green”,Uralla for 0-100mm, 100-200mm, 200-300mm and 300-400mm depths	100
Figure 5.5	Individual exchangeable salt load (kg) for areas 5m x 4m x 0.4m slice of the total area of 25m x 28m x 0.4m at “Adgin Green”, Uralla	102
Figure 5.6	Scatter plot of EM38 and soil core EC reading showing the relationship between the two parameters	106
Figure 5.7	Electromagnetic computer generated survey of 0-5.0m depth at “Bergen Op Zoom” Walcha	107
Figure 5.8	EM38 electromagnetic computer generated survey at 0-0.75m depth at “Bergen Op Zoom”, Walcha	108
Figure 5.9	EM38 electromagnetic computer generated survey at 0-1.5m depth at “Bergen Op Zoom”, Walcha	109
Figure 5.10	EM38 electromagnetic computer generated survey at 0-3.0m depth at “Bergen Op Zoom”, Walcha	110
Figure 5.11	EM38 electromagnetic computer generated survey at 0-6.0m depth at “Bergen Op Zoom”, Walcha	111
Figure 5.12	Volume of water pumped (litres) per pumping from each of the five experimental ponding sites from 25/11/93 till 25/02/96	112
Figure 5.13	Rainfall charts for 1993, 1994, 1995 for the properties of “Bergen Op Zoom”, “Blaxland” and Willhelmshohe, with the drought year of 1994 and long term averages over 107 year period	113
Figure 5.14	Total dissolved salts (kg) per pumping per dam for the five experimental ponding treatments from 25/11/93 to 25/02/96	115
Figure 5.15	Sodium (kg) per pumping per dam for the five experimental ponding treatments from 25/11/93 to 25/02/96	115

Figure 5.16	Sodium adsorption ratio for the five experimental ponding treatments from 25/11/93 to 25/02/96	116
Figure 5.17	pH for the five experimental ponding treatments from 25/11/93 to 25/02/96 ..	116
Figure 5.18	TDS (kg) and sodium bicarbonate (kg) from the ponding trials showing a linear relationship exists between the two parameters	117
Figure 5.19	The standing herbage mass as dry weight (g/m^2) within the gypsum and epsomite treated rings at the five saline/alkaline scalds	124
Figure 5.20	Exchangeable sodium (mg/kg^{-1}) of initial and final soil cores at the 20 experimental sites incorporating the control and 4 treatments of ponding, reverse interception drains, gypsum and epsomite chemical ameliorates for the 4 depths 0-100 mm, 100-200 mm, 200-300 mm and 300-400 mm	128
Figure 5.21	Exchangeable sodium percentage (ESP) of initial and final soil cores at the 20 experimental sites incorporating the control and 4 treatments of ponding, reverse interception drains, gypsum and epsomite chemical ameliorates for the 4 depths 0-100 mm, 100-200 mm, 200-300 mm and 300-400 mm	128
Figure 5.22	SAR of initial and final soil cores at the 20 experimental sites incorporating the control and 4 treatments of ponding, reverse interception drains, gypsum and epsomite chemical ameliorates for the 4 depths 0-100 mm, 100-200 mm, 200-300 mm and 300-400 mm	129
Figure 5.23	pH of initial and final soil cores at the 20 experimental sites incorporating the control and 4 treatments of ponding, reverse interception drains, gypsum and epsomite chemical ameliorates for the 4 depths 0-100 mm, 100-200 mm, 200-300 mm and 300-400 mm	129
Figure 5.24	Infiltration (mm/hr) for the five treatments of control, ponding, reverse interception drains and the chemical ameliorates of gypsum and epsomite during the experimental period from 10/11/93 to 15/03/96	131

LIST OF PLATES

Plate 4.1	Fenced off peizometer tubes at property “Wollun Station”, Wollun	72
Plate 4.2	Grid system of pegs for removal of soil cores at “Adgin Green”, Uralla	74
Plate 4.3	Soil pit dug at “Wollun Station” Wollun to investigate soil horizons	76
Plate 4.4	Electromagnetic survey of a scald site at “Glendella” using the hand held EM38 unit following set distances along a transect measuring at 0.75 and 1.5 m depths	77
Plate 4.5	Electromagnetic survey of a scald at “Glendella” using the EM31 unit following set distances along a transect and measuring at 3.0 and 6.0 m depths	77
Plate 4.6	Electromagnetic survey of a scald site at “Buri West” using the EM31 unit which was mounted onto a 4WD bike to survey large areas at 5.0 m depth	78
Plate 4.7	Pond installation at “Adgin Green”, Uralla	80
Plate 4.8	Completed pond at “Adgin Green”, Uralla	80
Plate 4.9	Construction of a reverse interception drain at “Lakeview”, Uralla	82
Plate 4.10	Completed reverse interception drain at “Lakeveiw”, Uralla	82
Plate 4.11	Installation of 1 m diameter steel rings for chemical ameliorate treatments	83
Plate 4.12	Steel rings positioned prior to backfilling the soil outside	84
Plate 4.13	Steel ring in position for chemical ameliorate treatments at “Buri West”, Walcha	84
Plate 4.14	Fenced off chemical ameliorate treatment at “Wollun Station”, Wollun	85
Plate 4.15	Disc Permeameter used to measure water infiltration capacity at scald sites	86
Plate 5.1	Soil cores extracted from “Adgin Green”, Uralla, NSW	98
Plate 5.2	Soil cores extracted from “Adgin Green”, Uralla, NSW	98
Plate 5.3	Soil cores extracted from “Adgin Green”, Uralla, NSW	99
Plate 5.4	Soil cores extracted from “Adgin Green”, Uralla, NSW	99
Plate 5.5	Soil samples taken from the A, B and C horizons at “Wollun Station” Wollun	103
Plate 5.6	Reverse interception drain at “Glendella” showing the diversion of surface and lateral water	118
Plate 5.7	Scalded surface at the reverse interception drain site at “Maryland” prior to drain establishment	119

Plate 5.8	Reverse interception drain site at “Maryland” after drain establishment showing almost complete revegetation of the previously bare surface	119
Plate 5.9	Bare scalded surface at the reverse interception drain site at “Glendella” prior to drain establishment	120
Plate 5.10	Reverse interception drian site at “Glendella” after drain establishment showing substantial revegetation of the previously bare surfaces	120
Plate 5.11	Reverse interception drain at “Maryland showing the accumulation of carbonates/bicarbonates at the interface of the A and B horizons	121
Plate 5.12	Reverse interception drain at “Maryland showing the accumulation of carbonates/bicarbonates at the the interface of the A and B horizons	121
Plate 5.13	Gypsum ring with cracks appearing after several rainfall periods at “Wollun Station”	125
Plate 5.14	Epsomite ring showing cracks and formation of organic matter layer	125
Plate 5.15	Wind blown seeds caught in the chemical ameliorate rings at “Wollun Station”	126
Plate 5.16	Chemical ameliorate rings at “Wilgar” showing vegetative growth	126