



## Groundwater Group Fact Sheet

### GROUNDWATER SALINITY

Groundwater quality is usually expressed as salinity in units of milligrams per litre (mg/L). This value is obtained by measuring the electrical conductivity of a sample in Electrical Conductivity (EC) units and then converting to mg/L, see the Table 1. below.

The maximum recommended salinity (in mg/L) for a range of animals and plants are shown in Tables 2. & 3. **These must be used as a general guide only.** Further information is available from your district office of Primary Industries and Resources South Australia (PIRSA). A salinity analysis may be obtained from DWLBC Water Salinity Testing at Glenside (08) 8379 9574. The Australian Water Quality Centre at Bolivar (08) 8259 0215 offers a similar service and can carry out full analyses and nitrate analysis for human consumption. (See reverse for contact details)

#### LIVESTOCK

Livestock vary considerably in their ability to tolerate salt in drinking water. The more important factors affecting tolerance are:

- Stock can tolerate higher salt levels when on green pastures than when on dry feed, prepared rations or saltbush.
- Pregnant, lactating or young animals require lower levels of salinity than dry mature stock.
- Changes from low to high salt levels must be made slowly. Stock can become adjusted to lower levels and sudden changes can cause toxicity even though below maximum tolerance figures.
- Storage tanks and troughs need frequent flushing to prevent excessive build-up of salt from evaporation, particularly when high salinity water is being used.
- The composition of dissolved salts is important and some ions (e.g. sulphate, chloride, sodium and magnesium) cause most problems.
- Better quality water is required during periods of high-water intake (e.g. hot weather, high salt diets).

**Table 2. Animal Drinking Water Salinity Tolerance**

The following figures are a general guide only:

	Max. for healthy growth (mg/L)	Max. to maintain condition (mg/L)	Max tolerated. (mg/L)
Poultry	2,000	3,000	3,500
Pigs	2,000	3,000	4,000
Horses	4,000	6,000	7,000
Dairy cattle	3,000	4,000	6,000
Beef cattle	4,000	5,000	10,000
Sheep	6,000	13,000	#

#Depends on type of feed available  
(e.g. green feed, dry feed or saltbush.)

**Table 1. Total Dissolved Solids Conversion**

EC units at 25°C	mg/L	Grains/gallon
455	250	17
910	500	35
1,360	750	52
1,810	1,000	70
2,710	1,500	105
3,600	2,000	140
4,480	2,500	175
5,300	3,000	210
7,100	4,000	280
8,800	5,000	350
17,000	10,000	700
25,000	15,000	1,050

NOTE: For quick approximate conversion use:

EC units x 0.6 = mg/L  
mg/L x 1.8 = EC unit  
mg/L x 0.07 = grains/gallon

When taking a water sample from a well, remember that samples from unequipped wells can be highly unreliable. Trust should only be put in samples taken after pumping to remove at least three well volumes of water; this normally takes 15 to 20 minutes. It is recommended that a well, to be sampled for chemical analysis, be pumped for 30 to 40 minutes before the sample is taken.

#### HUMAN CONSUMPTION

Many Australian waters have high levels of salinity. Taste thresholds vary widely depending on the dissolved salts present. A salinity of 1 000 mg/L is generally palatable to most tastes, but up to 1 500 mg/L can be acceptable in areas where better quality water is not available. Above 1 500 mg/L, taste generally makes the water unacceptable.

All water intended for human consumption should be tested for full chemical composition to determine its compliance with the Australian Standards for drinking water. The analytical laboratory should be asked if the water is safe for drinking. Contact the Australian Water Quality Centre.

**As water restrictions apply within South Australia, the responsible and efficient use of any water resource available to you is encouraged.**

## IRRIGATED PLANTS

Use of groundwater for irrigation or garden watering depends not only on its salinity but also on the type of soil and its drainage characteristics, as well as local climate and rainfall. Generally speaking, plants can tolerate more saline irrigated water if:

- The soil has free drainage.
- Heavy and more frequent applications of water are used to wash excess salts through the soil beyond the reach of plant roots; normal winter rains will do this in the higher rainfall areas.
- The water is applied evenly and preferably directly to subsoil to minimise surface concentration of salts and risk of leaf damage by evaporation.

**Table 3. Plant Irrigation water Salinity Tolerance**

Crops and Pastures	Flowers and Shrubs	Fruit	Lawn Grasses	Vegetables
700 mg/L Broad bean Flax	300 mg/L Violets	300 mg/L Loquat	800 mg/L Bent grass	500 mg/L Beans (broad and field) Carrot*
850 mg/L Field peas and beans	700 mg/L Aster	500 mg/L Strawberry	1,200 mg/L Bluegrass Fescue Rye grass	Lettuce Onions Peas Radish
1,000 mg/L Clover <sup>‡</sup> Lucerne Sudax	Azalea Bauhinia Begonia Camellia Dahlia Fuschia Gladiolus Poinsettia Rose Zinnia	700 mg/L Almond Apricot Avocado Blackberry Grape Grapefruit Orange Peach Plum Walnut	3,000 mg/L Tall Fescue	700 mg/L French beans Cabbage Capsicum Cauliflower Celery Potato (sweet) Spinach Sweet Corn
1,200 mg/L Corn (forage) <sup>‡</sup> Groundnut Millet Rice (paddy)			5,000 mg/L Santa Anna couch	
1,350 mg/L Berseem clover <sup>‡</sup>		1,000 mg/L Apple Lemon Pear Raspberry	8,000 mg/L Kikuyu Sun turf ( <i>Paspalum vaginawm</i> )	
1,750 mg/L Soy bean	1,000 mg/L Bougainvillea Carnation Coprosma Hibiscus Vinca			1,000 mg/L Broccoli Cantaloupe Cucumber Gherkins Tomato (furrow irrigated)
2,000 mg/L Cereals (wheat). Sudan grass <sup>‡</sup>				1,350 mg/L Beetroot Potatoes**
2,100 mg/L Fescue <sup>‡</sup> Perennial rye grass. Safflower Sunflower <sup>‡</sup>		1,350 mg/L Fig Olive Pomegranate		2,100 mg/L Artichoke
2,800 mg/L Phalaris <sup>‡</sup> Sorghum Sugar beet.				3,000 mg/L Asparagus
3,000 mg/L Barley Cotton				
		(information supplied by Munn's Lawn Co. Ply Ltd)		*after 3-4 fern leaves **need good drainage
<sup>‡</sup> Relative yields for salinity figures is approx. 75%.				
Modified from Ayers R.S. & Westcot D.W., 1996. "Water Quality for Agriculture". FAO Irrigation and Drainage, Paper 29 Rev. 1				

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FOR FURTHER INFORMATION CONTACT:			Telephone	Facsimile
<b>Department of Water, Land and Biodiversity Conservation</b>				
Head Office	General Enquiries	Level 1 Grenfell Centre 25 Grenfell Street GPO Box 2834 ADELAIDE SA 5001	8463 6944	8463 6999
	Well Construction Permit Enquiries		8463 6875	8463 6840
	Drilling Inspectors		8463 6872	8463 6840
			8463 6873	8463 6840
	Groundwater Group		8463 6946	8463 6999
Groundwater Technical Services	Supervising Technical Officer	1 Wright Road, <b>Walkley Heights</b>	8260 0583	8260 0594
Geophysical Technical Services	Supervising Technical Officer	23 Conyngham Street, <b>Glenside</b>	8379 9573	8338 1925
	Water Salinity Testing		8379 9574	8338 1925
<a href="http://www.dwlbc.com.au">www.dwlbc.com.au</a>				
<b>The Australian Water Quality Centre</b>				
		Port Wakefield Road, <b>Bolivar</b> PMB 3, SALISBURY SA 5108	8259 0215	8259 0228
<a href="http://www.awqc.com.au">www.awqc.com.au</a>				