Fresh and Salty - Exploring Salinity

Fresh and Salty is a teacher led classroom activity that explores salinity. It is an activity targeted to Year levels 3-6 and is a maths themed activity for Education Week (17-23 May) in Victorian schools
Students are given two experiments to do. The first is "A taste of salt" to learn the technique for measuring salinity and gain an appreciation of different salt concentration levels by tasting the solutions. The second experiment involves using the salinity meter from the first experiment to test the salinity of water from creeks, rivers, wetlands and dams to better understand salinity issues in our catchments. The results are entered in the Saltwatch database to provide a snapshot of results from across the state.

Experiment 1: A taste of salt

In this experiment prepare four solutions, of different salinity levels, for comparison.

Aim:
Students learn the technique for measuring salinity and gain an appreciation of different concentration levels by tasting the solutions. This activity can be done in small groups or as a whole class demonstration.

Equipment required:

- Salinity meter
- Table salt
- Distilled water or rainwater
- Four (4) small clean containers (plastic cups)
- Teaspoons

Salinity measurement instructions:

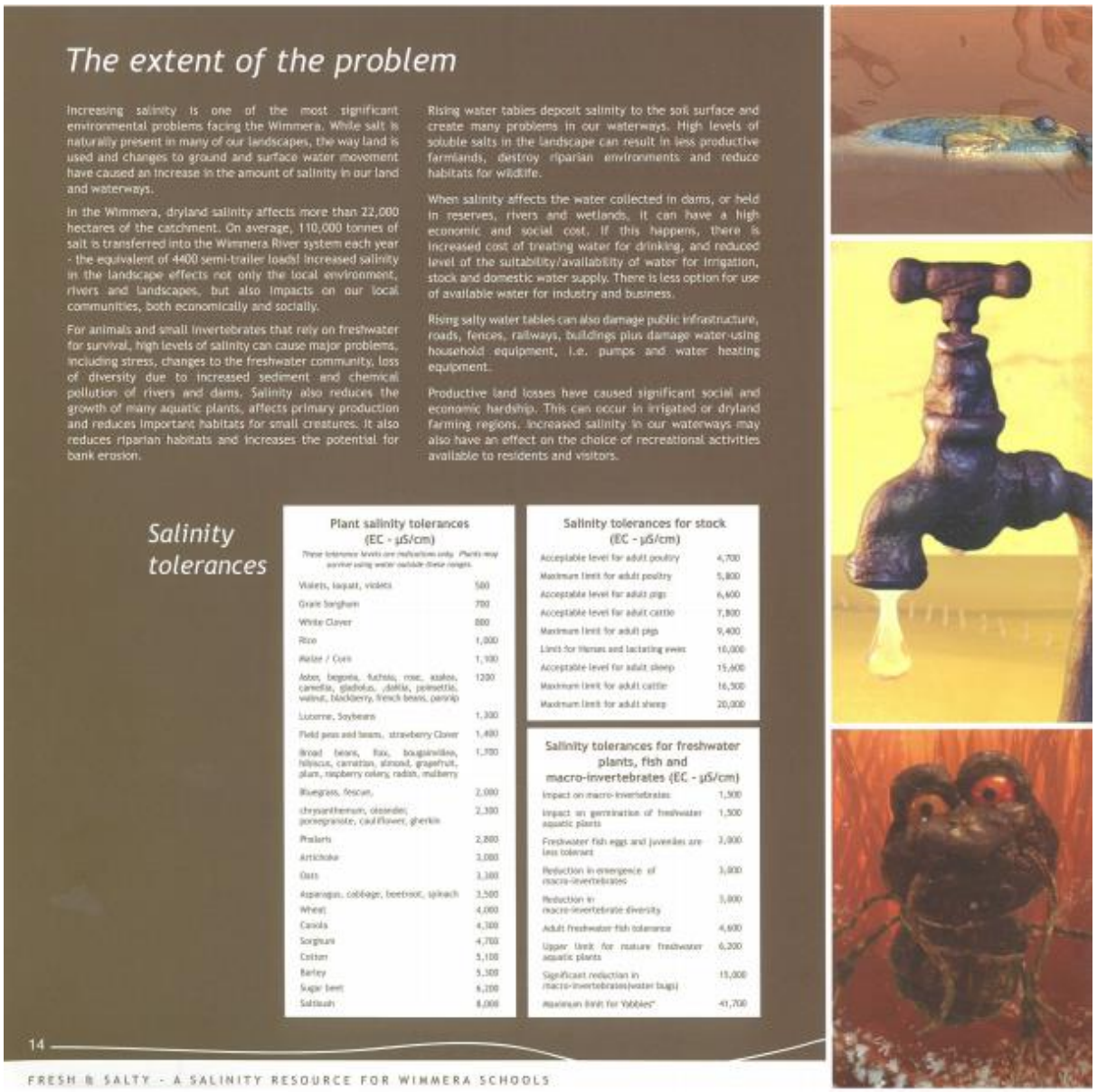
1. Label the containers 1-4 and half fill them with water
2. Follow the instruction below to measure the salinity level of the water in each container.
3. Add salt and stir, ¼ teaspoon at a time, to container 1 and measure the salinity level using the salinity meter (it should read less than 800 µS/cm). Record you EC results and how much salt was added in the table below.
4. Add salt to container 2 (again adding ¼ teaspoon at a time) until it measures approximately 1500 µS/cm. Record you EC results and how much salt was added in the table below.
5. Repeat step 3 for container 3 until it measures approximately 7,000 µS/cm.
6. Repeat step 3 for container 4 until it measures approximately 10,000 µS/cm.
7. Taste each solution and record your response.

How saline is that water? Measuring salt

1. Remove cap and rinse end of salinity probe in the water to be tested.
2. Switch unit on (on/off button)
3. Dip the end of the probe into the water to be tested. Gently swirl the probe until the numbers stop changing on the screen.
4. If the units on the meter are mS/cm, multiply your reading by 1000 to convert it to µS/cm (µS/cm are the standard units for measuring salinity)
5. Record your result
6. Rinse the end of the probe with tap water and turn off.

Container amount of salt (teaspoons)	Salinity level (µS/cm)	Taste

Follow up activities:
Ask students to create a Procedural Writing Test to recount the experiment. Provide students with a copy of the Water Quality tolerances and ask them to create an Illustated fact sheet.



The extent of the problem

Increasing salinity is one of the most significant environmental problems facing the Wimmera. While salt is naturally present in many of our landscapes, the way land is used and changes to ground and surface water movement have caused an increase in the amount of salinity in our land and waterways.

In the Wimmera, dryland salinity affects more than 22,000 hectares of the catchment. On average, 110,000 tonnes of salt is transferred into the Wimmera River system each year - the equivalent of 4400 semi-trailer loads! Increased salinity in the landscape effects not only the local environment, rivers and landscapes, but also impacts on our local communities, both economically and socially.

For animals and small invertebrates that rely on freshwater for survival, high levels of salinity can cause major problems, including stress, changes to the freshwater community, loss of diversity due to increased sediment and chemical pollution of rivers and dams. Salinity also reduces the growth of many aquatic plants, affects primary production and reduces important habitats for small creatures. It also reduces riparian habitats and increases the potential for bank erosion.

Rising water tables deposit salinity to the soil surface and create many problems in our waterways. High levels of soluble salts in the landscape can result in less productive farmlands, destroy riparian environments and reduce habitats for wildlife.

When salinity affects the water collected in dams, or held in reserves, rivers and wetlands, it can have a high economic and social cost. If this happens, there is increased cost of treating water for drinking, and reduced level of the suitability/availability of water for irrigation, stock and domestic water supply. There is less option for use of available water for industry and business.

Rising salty water tables can also damage public infrastructure, roads, fences, railways, buildings plus damage water-using household equipment, i.e. pumps and water heating equipment.

Productive land losses have caused significant social and economic hardship. This can occur in irrigated or dryland farming regions. Increased salinity in our waterways may also have an effect on the choice of recreational activities available to residents and visitors.

Salinity tolerances

Plant salinity tolerances (EC - µS/cm)

These tolerance levels are indications only. Plants may survive using water outside these ranges.

Violets, lisiant, violets	500
Grain Sorghum	700
White Clover	800
Rice	1,800
Maize / Corn	1,900
Aster, begonia, fuchsia, rose, azalea, camellia, gladiolus, dahlia, poinsettia, walnut, blackberry, french beans, parsnip	1200
Lucerne, Soybeans	1,300
Field peas and beans, strawberry Clover	1,400
Broad beans, flax, bougainvillea, hibiscus, carnation, almond, grapefruit, plum, raspberry celery, radish, mulberry	1,700
Bluegrass, fescue,	2,000
chrysanthemum, oleander, pomegranate, cauliflower, gherkin	2,300
Pistachio	2,800
Artichoke	3,000
Oats	3,300
Asparagus, cabbage, beetroot, spinach	3,500
Wheat	4,000
Canola	4,300
Sorghum	4,700
Cotton	5,100
Barley	5,300
Sugar beet	6,200
Saltbush	8,000

Salinity tolerances for stock (EC - µS/cm)

Acceptable level for adult poultry	4,700
Maximum limit for adult poultry	5,800
Acceptable level for adult pigs	6,400
Acceptable level for adult cattle	7,800
Maximum limit for adult pigs	9,400
Limit for Merino and lactating ewes	10,000
Acceptable level for adult sheep	15,600
Maximum limit for adult cattle	16,500
Maximum limit for adult sheep	20,000

Salinity tolerances for freshwater plants, fish and macro-invertebrates (EC - µS/cm)

Impact on macro-invertebrates	1,500
Impact on germination of freshwater aquatic plants	1,500
Freshwater fish eggs and juveniles are less tolerant	2,000
Reduction in emergence of macro-invertebrates	3,000
Reduction in macro-invertebrate diversity	3,000
Adult freshwater fish tolerance	4,600
Upper limit for mature freshwater aquatic plants	6,200
Significant reduction in macro-invertebrates(water bugs)	15,000
Maximum limit for Yabbies*	41,700

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FRESH & SALTY - A SALINITY RESOURCE FOR WIMMERA SCHOOLS

Reference: Fresh & Salty A salinity resource for Wimmera schools, 2008, Wimmera Catchment Management Authority

Experiment 2: Saltwatch testing

Saltwatch is an annual snapshot of salinity across Victoria, where school students, landholders and the wider community test salinity and water quality from samples collected at local water sources. Testing samples with a salinity meter helps determine salinity levels across the region. Ask students to bring in samples collected from local water soruces – dams, tanks, bores, creeks and rivers. Label the sample clearly with location name and colelection date and time. Post your results on the Saltwatch website by registering in advance of Saltwatch week (17-23 May '15).

Equipment required:

- Salinity meter
- Containers containing water samples

Procedure:

Follow testing procedure outlined above
Record results in the table below
Visit the Saltwatch page on the Waterwatch website http://www.vic.waterwatch.org.au/monitoring-and-data/994/ and follow instructions to enter data online

Students name and sampling location	Water body type: A. Groundwater eg bore B. Flowing surface water eg creek C. Still surface water eg dam	Salinity level (µS/cm)

Notes about these experiments:

The salinity meter required to complete the two experiments is sourced from regional Waterwatch coordinators if available. The remaining requirements are household items. In regional Victoria, sessions are offered to students in the catchments of Wimmera, North Central, Goulburn Broken and Corangamite. In Melbourne, sessions are also offered to schools in the City of Banyule, City of Manningham and the Merri Creek (through Merri Creek Catchment Committee).

Find your regional Waterwatch coordinator here http://www.vic.waterwatch.org.au/contact/1054/