

Oyster Shell Recycling

Order and Exemption

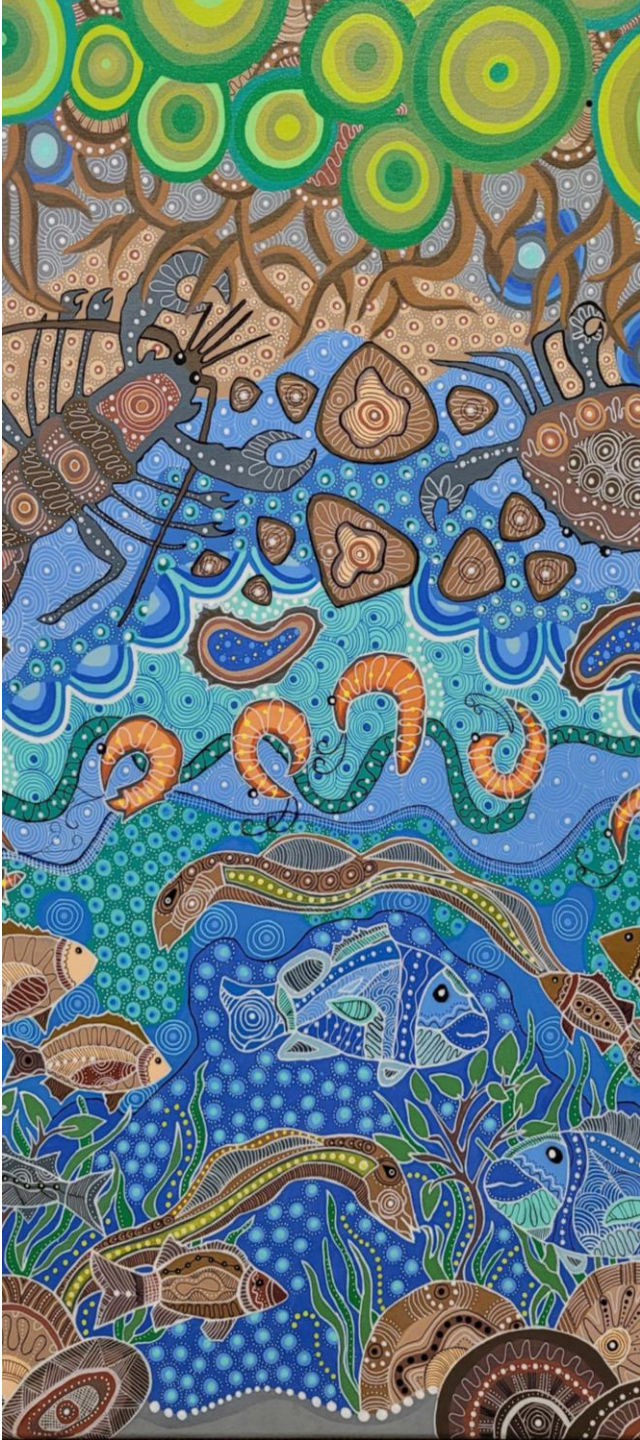
September 2024



Presenter:
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Aquaculture
Management

dpird.nsw.gov.au



The Department of Primary Industries and Regional Development acknowledges that it stands on Country which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for Elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.

Re-use of crushed oyster shells as a soil conditioner

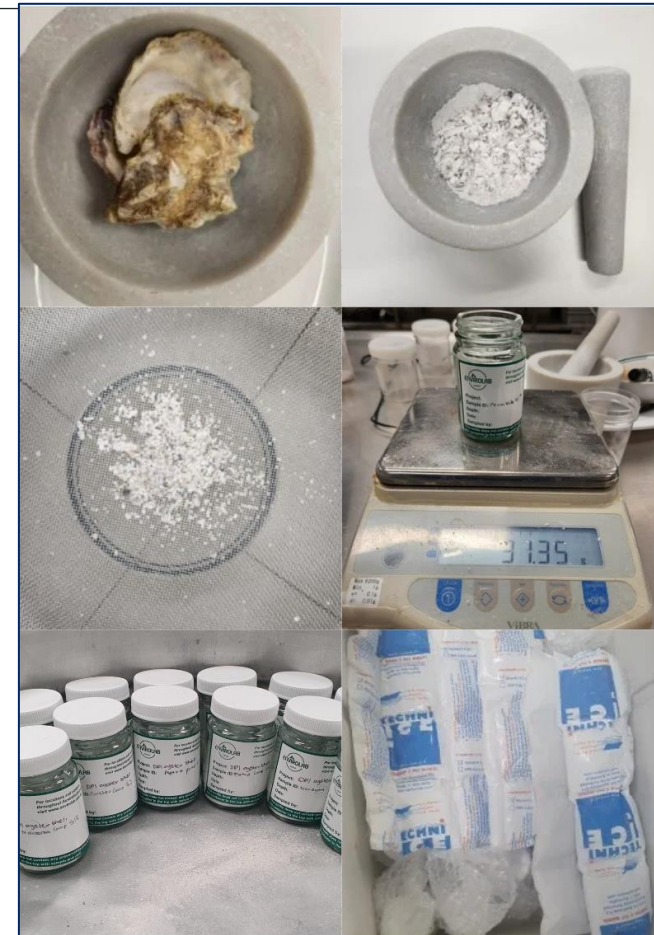
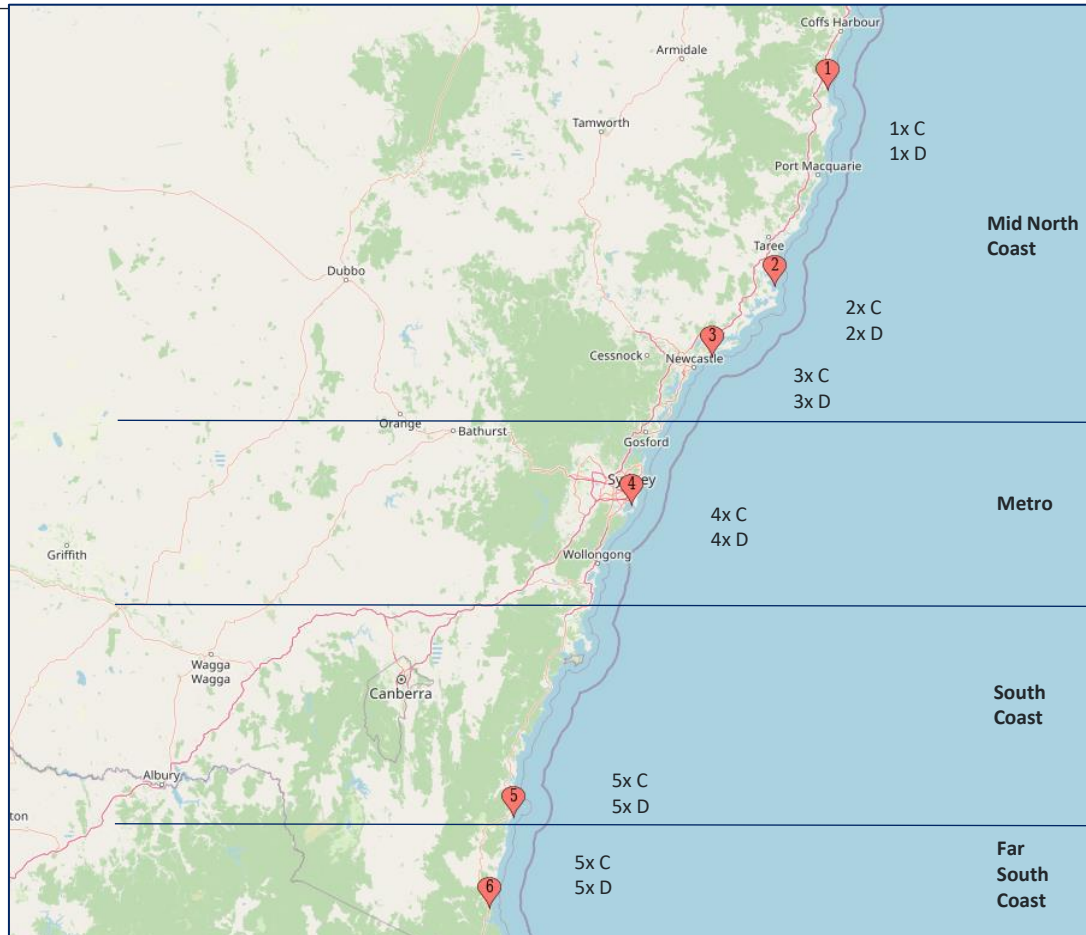
- Applied for an EPA Order and Exemption
- Can be spread on gardens (residential, recreational and commercial) and agricultural areas as a **natural fertiliser and soil amendment.**



Sampling design approach

20x
Composite
Samples

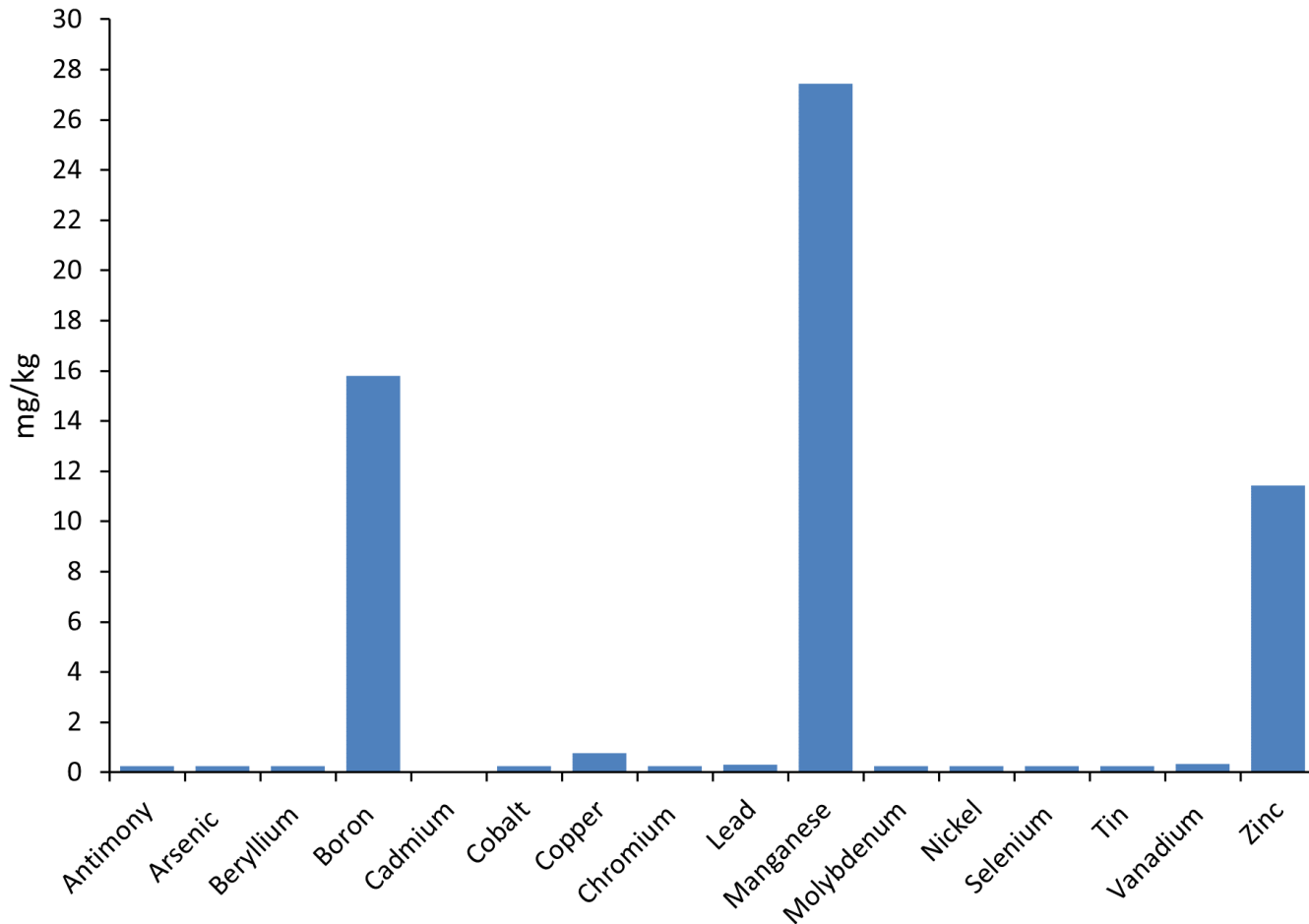
20x Discrete
Samples



Results



Oyster shells are ~ 92% calcium carbonate, with additional minerals such as:



Shell composition

Primarily calcium carbonate, with three notable micronutrients beneficial for agricultural use – manganese, boron, and zinc.

Insignificant contamination

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
alpha-BHC	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
gamma- Chlordane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-Chlordane	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve																				
DDT+DDD+DDE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	<0.1	107	106	106	103	103	100	103	101	106	105	102	102	101	99	99	96	97	97	96



Low contamination risk
 All pesticide levels were reported below the detection limit of 0.1, and there is likely to be more harmful bacteria in the soil, than in the oyster shell meal

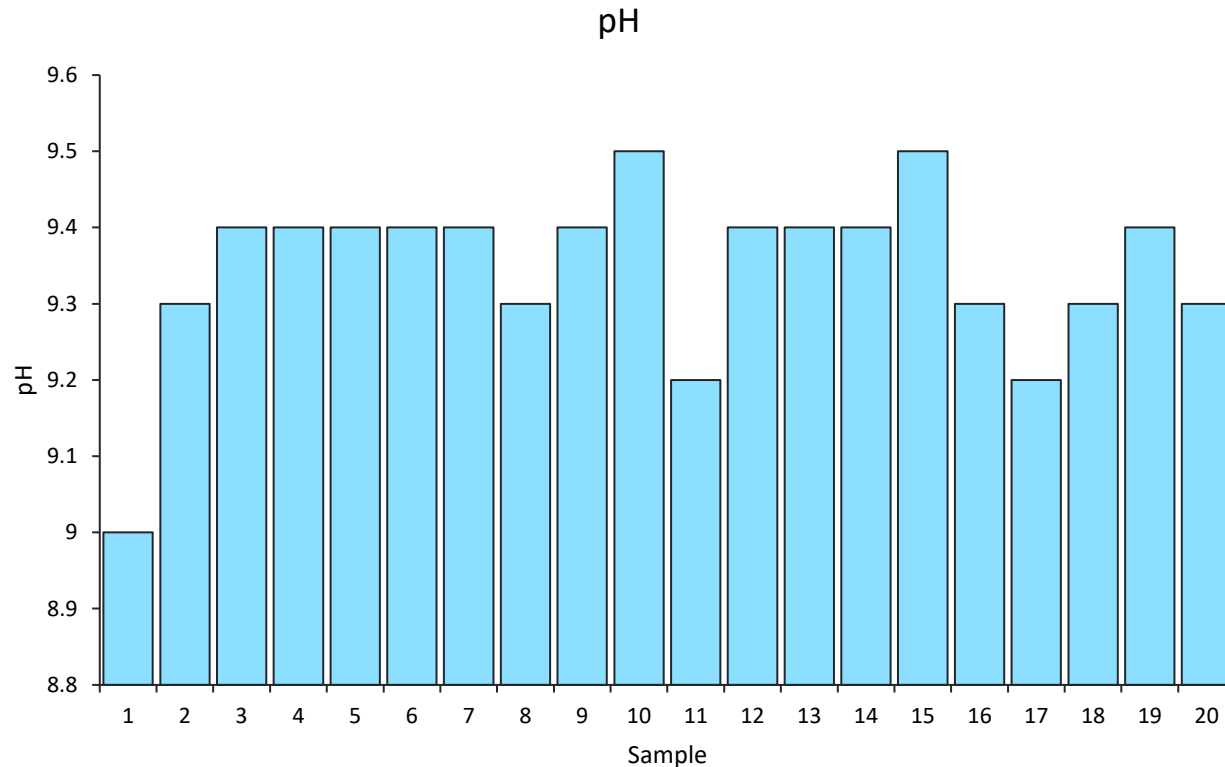
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Salmonella																					
<i>E. coli</i> (MPN/g)																					
Faecal coliforms (MPN/g)																					

Not Detected

Detected

pH levels

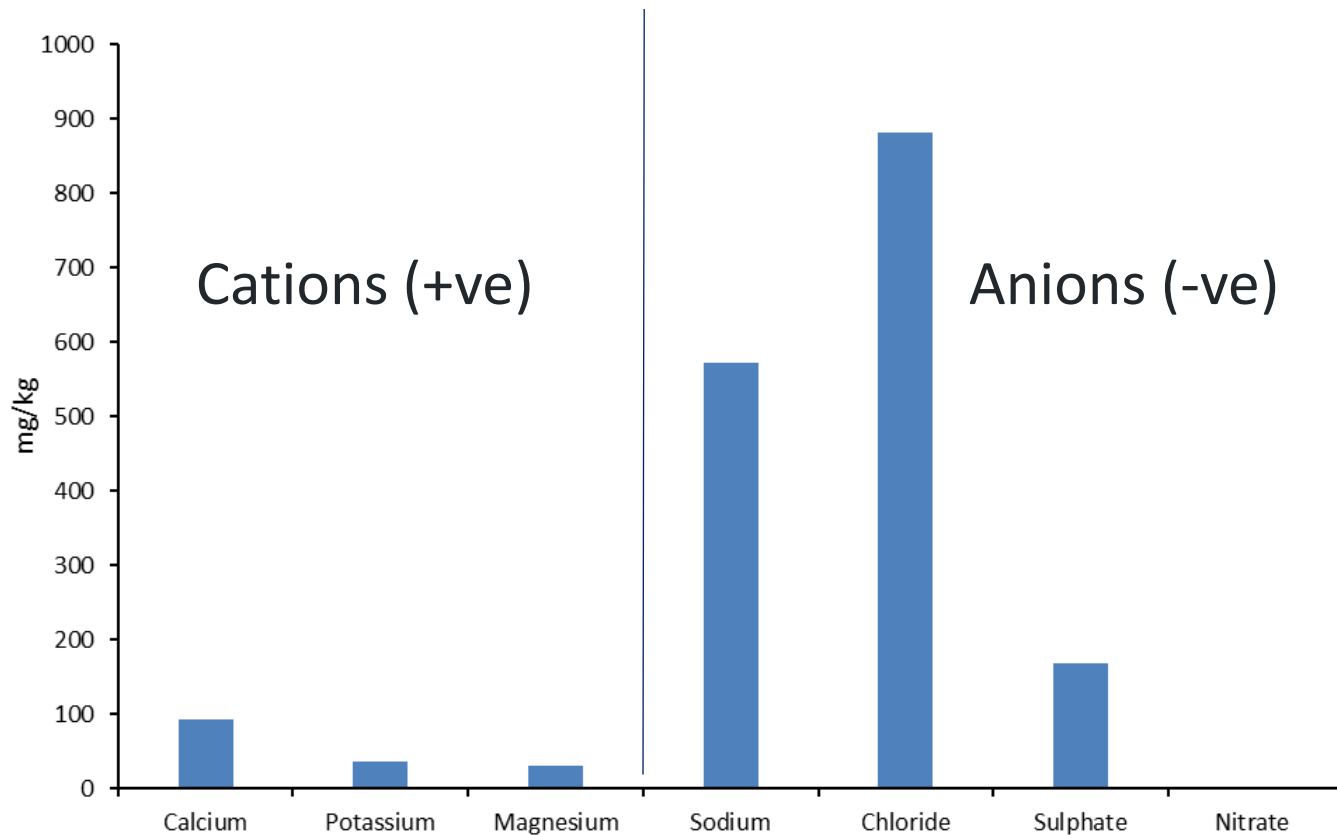
Highly consistent with literature (pH 9.3) confirming the meal as a candidate for a natural pH soil amendment



pH

The shell increases the pH of receiving acidic soils, raising a plant's ability to take up micronutrients and reduce the amount of acidic runoff

Increased CEC



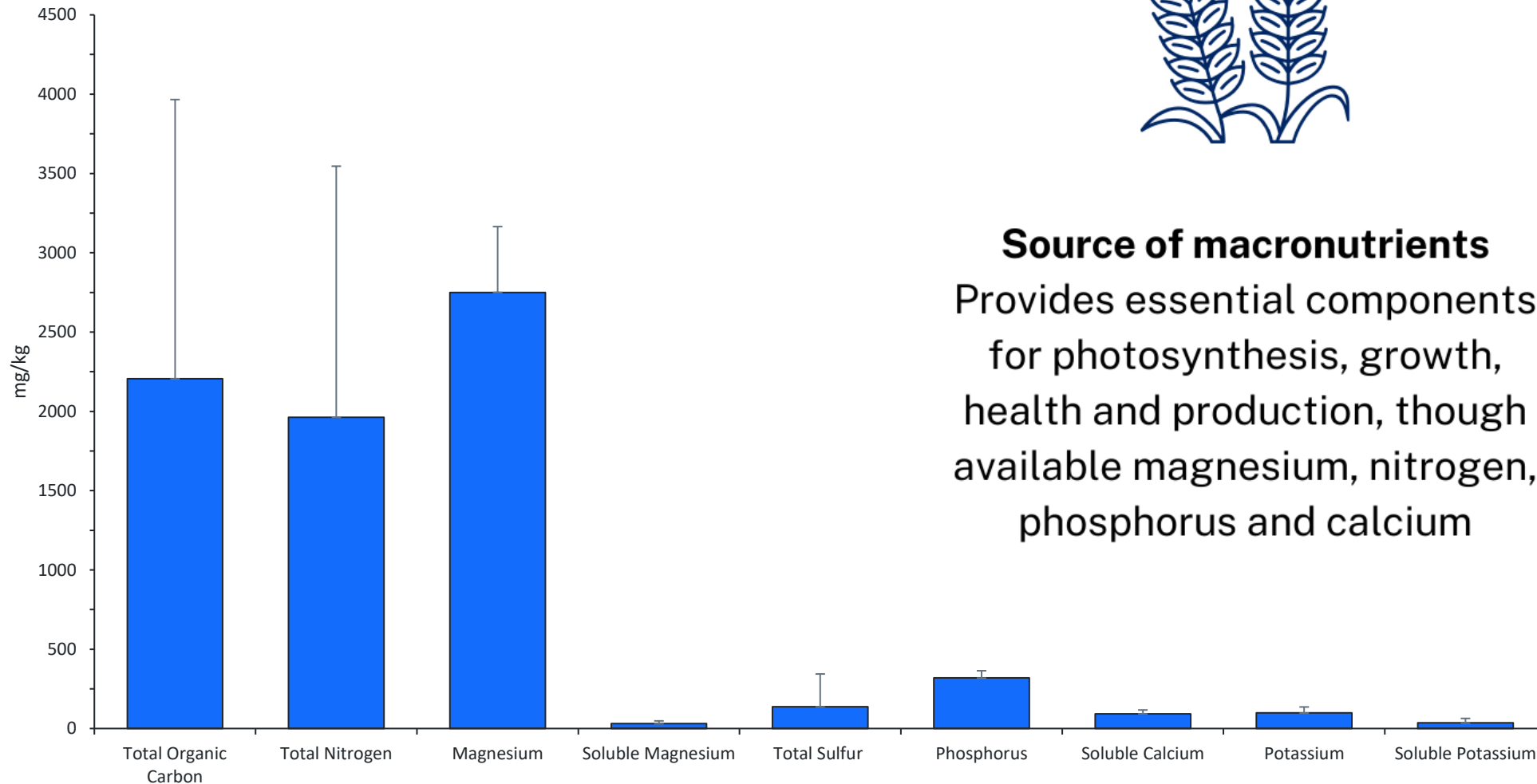
Bars indicate Standard error



Increased CEC

Indicates soil's ability to supply three important plant nutrients: calcium, magnesium and potassium

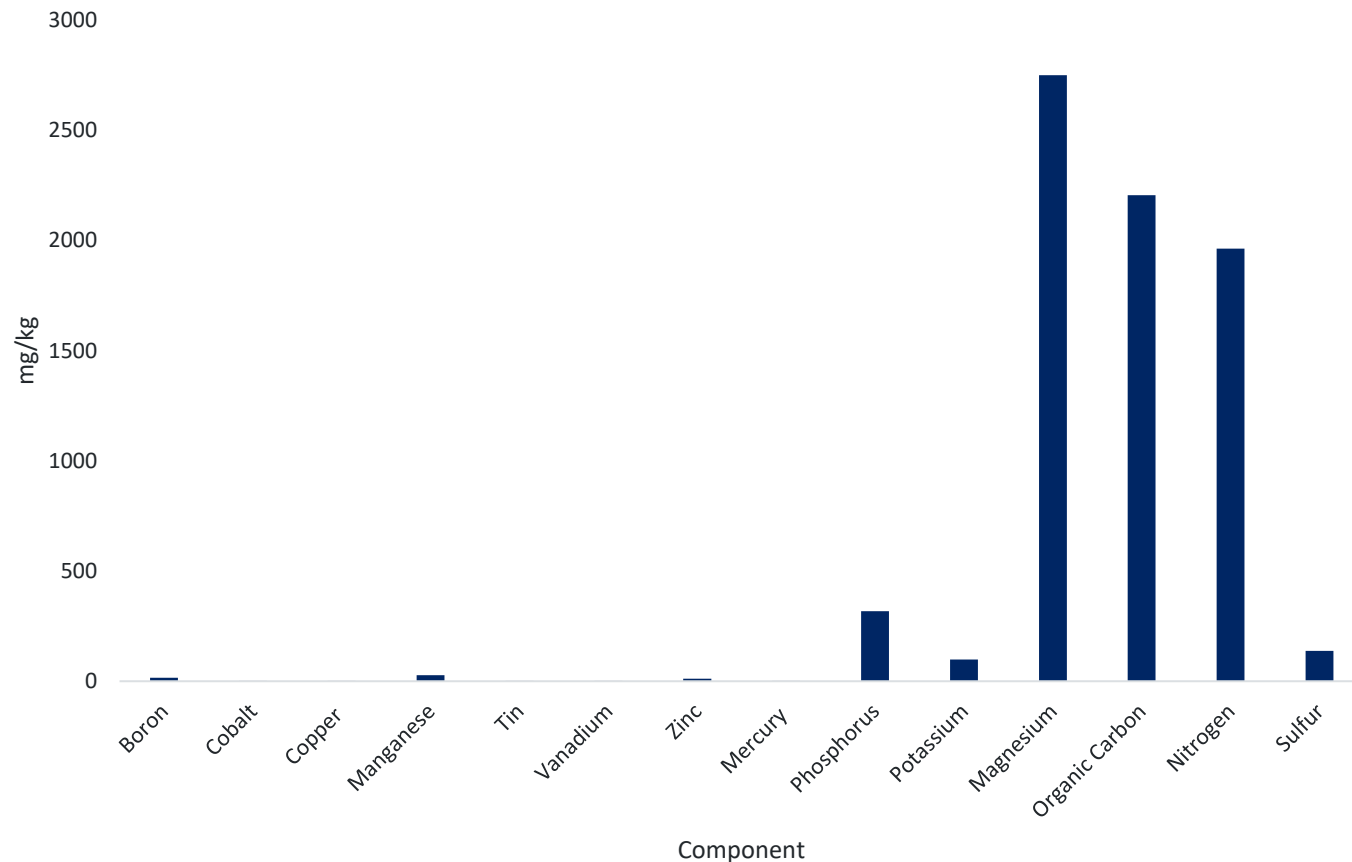
Macronutrients



Source of macronutrients
Provides essential components for photosynthesis, growth, health and production, though available magnesium, nitrogen, phosphorus and calcium

Bars indicate Standard error

Oyster shell meal is a low-cost, high-value resource recycling option, For a product that would otherwise add 1,250 tons of waste to landfills each year



Carbon footprint

The meal does not require carbon heavy processing which is currently limiting the viability of large quantities of oyster shells being recovered elsewhere

What does this mean?

Currently, 1 tonne of oyster shell costs **~\$287
to dispose of on landfill or accumulates on land bases**

Current prices for 1kg of premium oyster
shell meal in AUS:
\$20-40*

Current prices for 1kg of agricultural
oyster shell meal in US:
\$1.2-6.07*

**So, 1 tonne of premium- grade oyster
shell could potentially be sold for
around
\$20,000****

**So, 1 tonne of agricultural-grade oyster
shell could be sold for up to
\$1,200-\$3,000****








*Sourced from preliminary market research August 2024

** The prices listed above are estimates based on current market research and are subject to change.

We need your feedback on the draft Order and Exemption

Current conditions proposed include

-  • Dry the shells in the sun for 90 days. At least 30 of those days must be sunny.
-  • Rinse the shells with freshwater to remove excess salt. This step is crucial for approval.
-  • Regularly test the processed shells to make sure they are safe and match previous samples.
-  • Keep written records of each shell pile and its history.
-  • Shell fragments should be no larger than 10mm.

Questions?