GOVERNMENT OF WESTERN AUSTRALIA

Department of **Water and Environmental Regulation**

Department of **Primary Industries and Regional Development**

Project factsheet

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June 2020

Water treatment trials 2016–18

Lower Vasse River

Scientists from the Department of Water and Environmental Regulation successfully trialled a new phosphorus-binding clay product (HT- clay) to reduce algal blooms in the Lower Vasse River. The trial builds upon earlier successful trials of the only commercial phosphorous-binding clay currently available, Phoslock®. The trial was part of the Revitalising Geographe Waterways program, which aims to improve water quality and waterway health and management of Geographe waterways, and was supported by the Regional Estuaries Initiative.

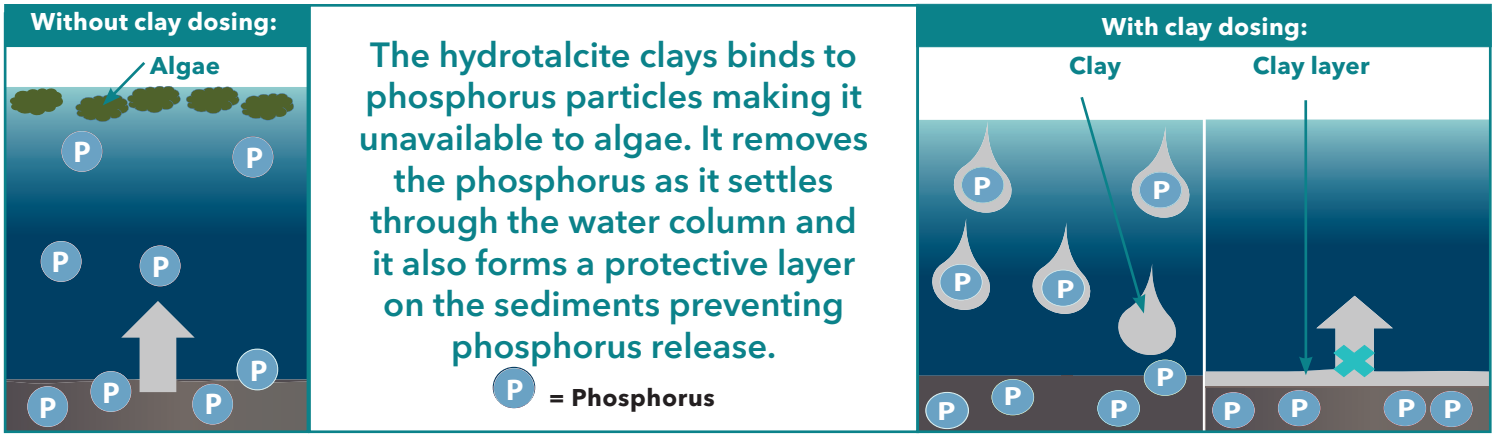
Why are these trials important?

The Lower Vasse River runs through the centre of Busselton and is highly valued by the local community. Toxic blue-green algal blooms occur over summer months and impact the social and recreational values of the river. High nutrient concentrations, particularly phosphorus, fuel excessive algal growth. Phosphorus enters the Lower Vasse River in groundwater and surface water and is also released from a thick layer of nutrient-rich sediments on the bed of the river. Improving water quality and reducing algal blooms in the river is a priority for the local community.

How does phosphorus-binding clay reduce algal blooms?

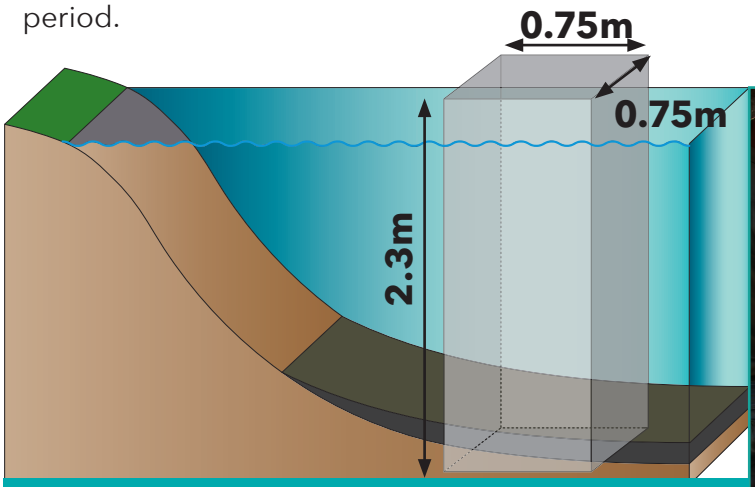
Phosphorus-binding clays are modified natural clays. They are sprayed onto the water surface as a slurry and bind to phosphorus in the water as they settle, making it unavailable to algae. They also form a layer on top of the sediments which captures phosphorus released from the sediment. The hydrotalcite (HT) clay being trialled in the Vasse River consists of a naturally occurring clay that is modified with a mineral coating which binds the phosphorus.

How does the clay work?



How did we test the clay?

In summer 2016–17, scientists installed 15 large bottomless tanks, or mesocosms, in the Lower Vasse River upstream of Causeway Bridge. They added different amounts of clay to these tanks in early December and monitored the water's visual appearance and its quality throughout summer. The trial showed that the clay successfully removed algae where it was applied, with visual improvements lasting throughout the summer period.



Mesocosm tanks installed in the 2016-17 water treatment trial

After the successful mesocosm trial, the trial was up-scaled the following year in summer 2017-18 to a larger treatment area in the river of about 455 m^2, with treatments separated by PVC curtains. One area was treated in December before the onset of algal blooms, and retreated with smaller top-up clay doses in February and March after summer rainfall. A second area was treated in February after the rainfall events, when an algal bloom was present, and received a top-up clay dose in March. A third area was left untreated as a control to mimic the slightly altered and more restricted conditions between the curtains. Water quality and algal growth were monitored in all three areas until the end of the trial in late March. Macroinvertebrates (bugs living within and near the sediments) were also monitored to see if there was any impact from the clay.

Treated mesocosm and surrounding water about three months after clay dosing.

What did we learn?

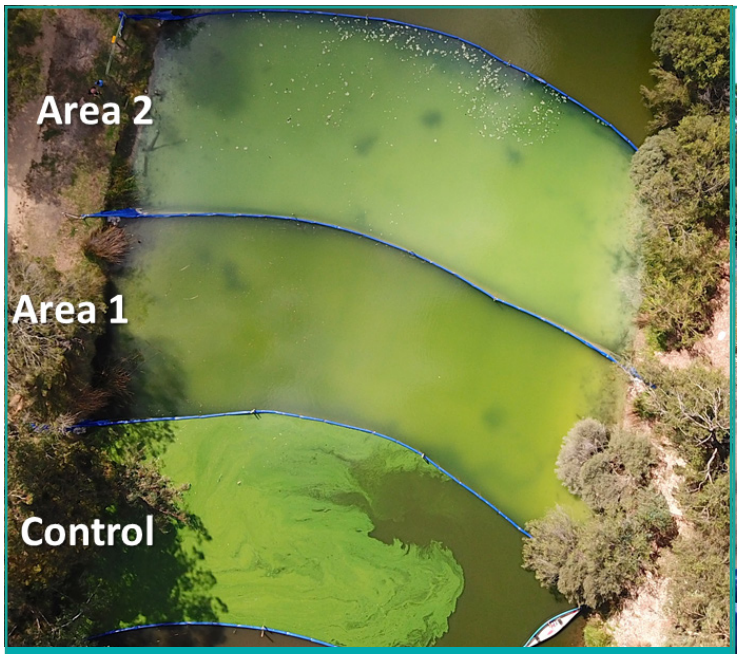
- HT-clay treatment effectively reduced algal blooms within hours of application.
- Phosphorus concentrations were reduced substantially within two to three hours of application and stayed below target thresholds over the entire monitoring period.
- HT-clay reduced phosphorus release from the sediment.
- HT-clay was effective at reducing algal blooms after the bloom was established, which is a major advantage over Phoslock®, which needs to be applied prior to a bloom.
- The HT-clay treatment did not have any negative effects on small invertebrate organisms living in the Lower Vasse River.

Clay application from a moving barge equipped with a petrol pump and spray boom.

Where to next?

The department will continue to investigate opportunities to progress HT-clay from an experimental product to one suitable for large-scale application, by:

- optimising clay production and transportation
- further developing environmental risk assessments under different environmental conditions
- conducting further research into efficiency of the clay under different conditions, such as high organic matter contents or higher salinities.



After clay application the water was extremely clear in the treated areas (areas 1 and 2), with structures such as wooden debris visible in the middle of the river. The green colour in these areas comes from algae which is now at the bottom of the river combined with the clay layer. In contrast, there is thick algal scum on the surface of the non-treated control area.

Installing PVC curtains

The trial of HT-clay and previous trials of Phoslock® have shown that phosphorus-binding clays are an effective option to reduce algal blooms and improve water quality in the Lower Vasse River over summer months.

Scientists estimate that around 40 tonnes of clay would be needed to reduce algal blooms in the Lower Vasse River between Causeway Bridge and the Old Butter Factory.

For more information on this trial please see the *Lower Vasse River Water treatment trials 2016-2018: Synthesis report – Can phosphorus-binding clay reduce algal blooms in the Lower Vasse River?* at rgw.dwer.wa.gov.au

GeoCatch

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REGIONAL ESTUARIES INITIATIVE

Revitalising Geographe Waterways

VASSE taskFORCE