

Connectivity Modelling to Protect Coral Spawning during Dredging



ISSUE

Regulatory authorities in Australia have sought to protect coral spawning events from potential adverse impacts caused by elevated levels of suspended sediment generated from dredging activities. The recent Reef 2050 Long Term Sustainability Plan proposes action to identify appropriate environmental windows to avoid dredging operations during coral spawning as part of a state-wide maintenance dredging strategy to be developed by the Department of Transport and Main Roads (WQA16). However, coral spawning typically occurs multiple times throughout the year and latest research indicates dredging would need to cease for a few months before and after spawning events to protect coral reefs from the effects of sediments on coral reproduction (Jones *et al.* 2015). This would significantly limit time that dredging could occur near coral reefs in any given year. Avoiding dredging during these windows may not be feasible as unscheduled changes is likely to result in costly delays or significant interruptions to port operations.

SOLUTION

Modelling coral reef connectivity provides an innovative management approach for ports to assess the risk of potential impacts from dredging during coral spawning windows. Modelling connectivity reveals the demographic linkage of local populations through the exchange of coral larvae. When coupled with the results for dredge modelling, evaluation of coral reef connectivity enables a quantitative risk-based management approach through assessing a range of operational control measures, such as modifying the dredging technique, location or spoil disposal area, to direct spill sources away from key reef areas and coral larval dispersal patterns.

O2 Marine staff have successfully applied a connectivity model for a capital dredging project in north-western Australia to gain regulatory approval from the State and Commonwealth to allow managed dredging activities to continue during coral spawning windows. The approach developed has also been peer-reviewed and endorsed by experts in the fields of coral biology and numerical modelling from CSIRO, AIMS and the WAMSI Dredging Science Node.

BENEFITS

Modelling coral reef connectivity aims to balance the needs of the industry, whilst meeting regulator and community expectations for the protection of the environment through successfully managing the impacts of dredging without substantial schedule or cost implications. Costs associated with dredging are prohibitive, however, receiving consent to dredge during coral spawning windows provides flexibility and associated cost savings for planning and implementation, which may include:

- Opportunities to capitalise on utilising dredge equipment when it is conveniently located to reduce expensive mobilisation costs;
- Coordinating maintenance dredging schedules to coincide with works required at other ports to distribute expensive mobilisation costs;
- Preventing dredging project risks associated with operating during least favourable conditions or during cyclone seasons;
- Allowing for delays associated with complicated dredge planning, approvals and preparatory surveys;
- Allowing for unexpected delays and difficulties experienced during execution of dredging operations (e.g. emergency maintenance, challenging substrate);
- Minimising downtime during coral spawning windows for dredging campaigns which extend in duration beyond intervals between these windows; and
- Increasing certainty in the ability to carry out maintenance and emergency dredging as the need arises to ensure safe navigable depths are maintained and the productivity of the port is not compromised.

Our assessment provides a precautionary evaluation of each project independently of factors which will influence the level of potential risk to coral communities during coral spawning windows, including but not limited to:

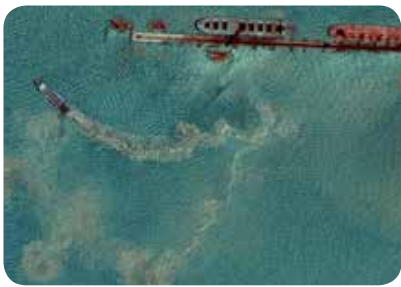
- The scale of the project;

- The equipment used;
- Disposal option selected;
- Dredge control measures available;
- Spatial distribution of coral reefs in the area;
- The location of these reefs relative to dredging activities; and
- The physical environmental conditions.

The approach derived by O2 Marine staff for evaluating coral reef connectivity has been demonstrated to be scientifically robust and appropriately precautionary to provide the level of confidence required for independent expert endorsement and regulatory approval that dredging can be managed during coral spawning windows to mitigate the potential for significant impacts on the functional ecology of local and regional coral reefs.

NEXT STEPS

Should this connectivity modelling approach be ideal to mitigate the risk of environmental harm and save money on your next project, O2 Marine would be pleased to meet with you to discuss how we can tailor our approach to meet your needs. Please contact O2 Marine Principal, Chris Lane at chris.lane@o2group.com.au or call on 0400 567 909 to arrange a meeting.



¹Jones, R., Ricardo, G.F., Negri, A.P. (2015) Effects of sediments on the reproductive cycle of corals. *Marine Pollution Bulletin* 100 (1): 13-33

ABOUT US

O2 Marine (www.o2marine.com.au) is a marine environmental consulting company specialising in the design and implementation of cost effective and scientifically robust marine monitoring programs. Our staff have significant experience in managing impacts to coral reef ecosystems for dredging projects throughout Australia. Our innovative approach to marine science is the opposite to 'business as usual', at O2 Marine we consider every project as an opportunity to 'DO BETTER' both for our client and for the marine environment.

O2 Marine is part of O2UDP (www.o2group.com.au), which brings together a partnership of highly specialised boutique businesses to offer a comprehensive and complimentary range of expert knowledge and innovation to the property, agriculture, infrastructure and resource sectors. We have offices in Brisbane, Sunshine Coast, Perth, Busselton, Toowoomba, Townsville, Mackay, Whitsundays, Papua New Guinea and Vietnam. As part of O2UDP, we offer all the benefits of a larger, international consultancy, but with a technically focused, personalised level of service that our larger competitors are unable to achieve.



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